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ABSTRACT

The focus of this monograph is to review several ways to incorporate environmental education into pre-service education without greatly modifying the content and structure of teacher preparation courses. Sections concern: (1) environmental education: a brain compatible approach to learning (supporting environmental education as a model for effective information processing); (2) strategies for teaching environmental education (identifying sources and models of teaching methods; (3) using children's literature to promote environmental awareness (containing a bibliography of children's books and suggestions for encouraging an environmental perspective); (4) wildlife education and social studies (presenting a list of 13 social study objectives and indicating their correlation to 50 activities which are primarily from Project WILD); (5) evaluation of knowledge and attitudes toward environmental education (consisting of the 40-item instrument and the test results of the participating pre-service teachers (N=30); (6) outdoor school (describing the components and programs of the outdoor school of California State University, San Bernardino and including charts for interactive concepts for levels 1 through 6 and for four categories of energy and environmental objectives and activities for grades K through 12); and (7) lesson plans (containing the plans developed and taught by pre-service teachers). (ML)

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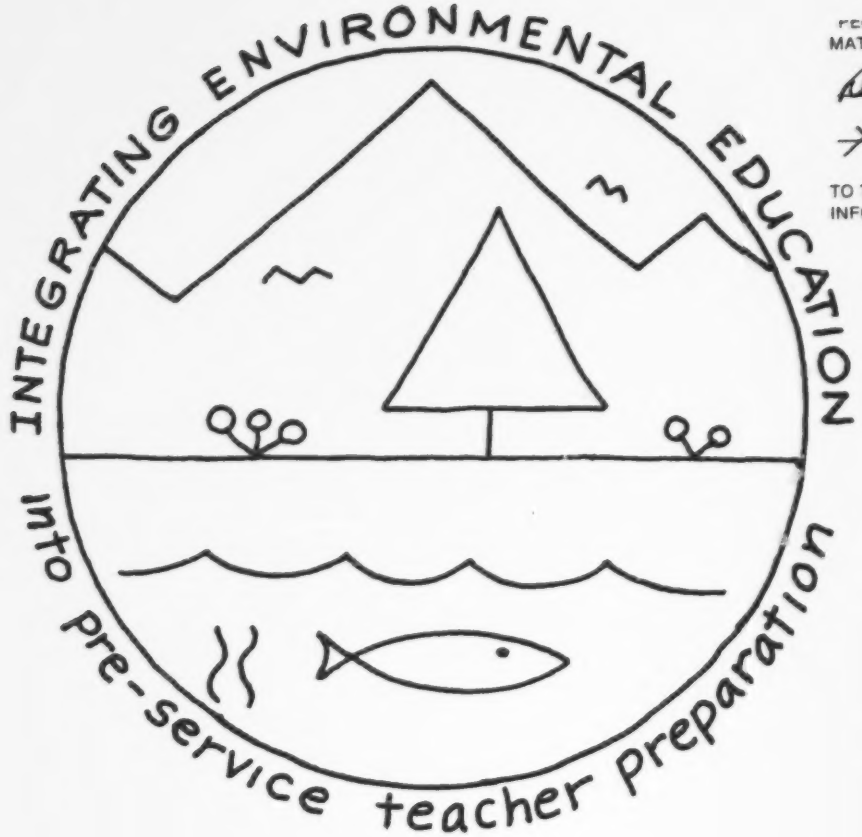

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INTEGRATING ENVIRONMENTAL EDUCATION INTO PRE-SERVICE TEACHER PREPARATION

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August 1986

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Introduction

Darleen K. Stoner

The usual one-year, post-graduate program for preparing elementary and secondary teachers in California generally does not include the acquisition of competency in environmental education. Yet it is just this competency that is needed by teachers. In 1968 the California legislature passed laws requiring the teaching of environmental education in grades one through twelve. To produce environmentally literate students there must be the teachers who can provide effective instruction. Research has shown that pre-service teachers do not have skills and knowledge about teaching environmental education (Peyton and Hungerford, 1980; Schwaab, 1976), nor do in-service teacher (Champeau et al, 1980).

The focus of this monograph is to review several ways to include environmental education into pre-service education without greatly modifying the content and structure of the teacher preparation courses. Most of the modification is done in the types of examples that are provided and in the student assignments given. The greatest deviation is in the implementation of a two-day outdoor school.

The methods presented here were tested with students in the Alternative Credential Track (ACT) at California State University, San Bernardino. In this program, students preparing to be either an elementary or secondary teacher studied with four instructors during the academic year. Instead of individual courses, these students participated in blocks of integrated coursework. Although this format is not commonly found in other teacher preparation programs, many of the techniques utilized to teach environmental education could fit into standard courses.

In this program, pre-service teachers

- achieve an understanding of the goals and methods of environmental education.
- gain knowledge of basic ecological principles and concepts.
- utilize theories of learning in providing appropriate teaching-learning situations.
- master several models of teaching which are effective for teaching environmental education.
- prepare and implement lessons with environmental education concepts.
- evaluate environmental education instruction.

Instructors assisted students in meeting these objectives by presenting

1. the relationship of brain functioning with learning environmentally.
2. activities from Project WILD in conjunction with an introduction to environmental goals, methods and concepts.
3. models of teaching utilizing environmental examples.

4. children's literature with an environmental education interpretation.
5. social studies objectives related to Project WILD.
6. a 2-day outdoor school which included many discipline areas.

Project WILD, mentioned twice above, provides a multitude of interdisciplinary activities that use wildlife to teach basic ecological concepts. Developed by the Western Regional Environmental Education Council, the elementary and secondary guides are available from the Department of Fish and Game in most states and have a workshop requirement for distribution. Having a guide in hand will be helpful to fully understanding the pre-service program described here.

Most of the instruction related to environmental education was completed during fall quarter. This instruction is briefly described in chapters in this monograph. The outdoor school was the last component before students prepared an environmental lesson plan which was videotaped in a peer teaching situation. Peer teaching of other lessons had already been done several times by these students during the quarter.

The selection of student-developed lesson plans presented in this publication were actually taught during winter of spring quarters. Some of the lessons are available for viewing on a videotape. The format of these lesson plans varies due to the specific requirements of different master teachers and schools.

The pre-service teachers were pre- and post-tested on their knowledge about and attitude toward environmental education. The significant results, presented in the evaluation chapter, portray the distinct value of this program.

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Champeau, R., Gross, M. and Wilke, R. "An Assessment of Teachers' Understanding and Use of 'Goals for Curriculum Development in Environmental Education'." In A. B. Sacks et al. (eds.), Current Issues VI: The Yearbook of Environmental Education and Environmental Studies. Columbus, OH: ERIC/SMEAC Information Center, 1980.

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ENVIRONMENTAL EDUCATION: A BRAIN-COMPATIBLE APPROACH TO LEARNING

Renate Nummela
and
Darleen K. Stoner

In order to recognize the potential contribution to learning offered by environmental education it will be helpful to imagine the following two examples. In the first example Molly is looking at charts describing various soil types which she must memorize. She takes a test on the information memorized and then goes on to the next unit memorizing labels or identifying other specified information deemed necessary for mastering a unit on natural environments of plants and animals.

In our second example, Molly is outdoors, learning to identify various plants in their natural environment. Her teacher points out how the type of plant life provides shelter and nourishment for various animals. She actively observes and experiences the relationship between the type of soil and resultant plant and animal life.

Besides the natural potential for searching out additional cause-effect relationships, our second example provides our student with smells, sounds, and sights which help to further identify and experience a multiplicity of additional information.

Environmental education provides a pattern that connects. Everything in nature is interrelated. Since it is not always possible to take students outdoors to learn, environmental education can serve as a model for teaching and learning in the classroom. Environmental education means that a student doesn't just learn specifics, but does so while seeing relationships with other components in the environment. This type of environmental learning is compatible with research on the networks and connections within the brain.

Recent research on the human brain (O'Keefe and Nadel, 1978) provides us with fascinating information on how the brain, particularly how long-term memory storage works. The information identifying two ways memory is stored is of particular interest to environmental education because it highlights the importance of information learned in context.

To make this a little clearer, we need to imagine what O'Keefe and Nadel call route and map learning.

Route Learning

If we find ourselves in the middle of a city we are visiting and need to go to the city park, we would consult a map or someone familiar with the city to help us chart a route to the park. We would then follow their instructions and achieve our objective. Finding the park, however, has taught us little about the rest of the city or, for that matter, how

to go from the park to another area of the city. We achieved our objective but in the process learned very little about our environment and the relationship between various areas of the city, what is in the north or south, and so on.

Route learning involves the storing of specific facts or series of facts independent of a broader context. Formulas, poems and facts memorized fit into this category. Route learning has advantages because it is quick in the sense that we can specify goals and test outcomes. It has limitations, however, as we shall see.

Map Learning

Map learning involves immersion in the environment. In the case of finding the park in our unknown city, for example, we would allow ourselves a few days to discover the main streets and sections of the city. In short, we would develop a "map" of our environment which would allow us to find our way to the park based upon our understanding of the relationship between various streets and sections of the city. Our learning took more time, but is far more useful because not only can we find our way to the park, but to all sorts of other places.

O'Keefe and Nadel further define route and map learning as "taxon" and "locale" memory learning. Taxon learning involves relatively abstract information stored as facts or specified programs. "I before e, except after c" is a memorized rule with very specific application, as are the multiplication tables and other handy tools such as memorized spelling words and the names of items and products. Locale memory learning, however, involves learning which occurs in context. Learning in context includes experiential or discovery learning. It is different because we can learn something all at once because we experience it through all our senses and the brain's multiple patterning of already stored information. Chasing a rabbit through brush on a hot day can teach us that the rabbit can run fast and what it looks like, but it also teaches us about the brush and the ground and the weather and much more. Also, it is likely that we never forget this incident or at least will easily recall it when prompted. This is very different from "taxon" learning which requires repeated rehearsal and memorization of individual facts.

Implications for Education

Education has long favored taxon learning. Perhaps the effort involved has made it seem more like learning. Yet the brain is capable of taking in so much more information at one time. Learning is highly complex and involves both map and route learning. Environmental education gives the brain the freedom to expand and explore beyond specified material to be memorized. It provides an ideal model for teaching and learning.

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O'Keefe, John and Lynn Nadel. The Hippocampus as A Cognitive Map. Oxford, Great Britain: Oxford University Press, 1978.

STRATEGIES FOR TEACHING ENVIRONMENTAL EDUCATION

Darleen K. Stoner

Environmental education can be described in many ways. I like to say that it is studying the concepts and values through which we recognize our interdependence with the environment, as well as our responsibility for maintaining a culture that will sustain a healthy environment. With an emphasis on scientific aspects, environmental education should be considered a theme that can be applied on an interdisciplinary approach.

The goals for these teachers-to-be are to acquire the motivation and a repeitoire of teaching strategies for environmental education. To enable these teachers to develop lesson plans with an environmental aspect, they learned ecological and environmental concepts, practiced classroom strategies, and participated in an outdoor school experience.

The sources used for concepts were Project WILD, Ekistics, and California Environmental Education Guide. Activities selected from Project WILD were presented before, during, and after the outdoor school experience, often in conjunction with a particular classroom strategy. The environmental concepts from Ekistics and the California Environmental Education Guide were provided to the teachers as part of the outdoor education packet.

Activities from Project WILD were frequently done. Beginning with the teachers observing crickets (variation on Grasshopper Gravity), the value of first-hand experiences was demonstrated. Several ecological principles vividly portrayed through WILD activities include: carrying capacity (Classroom Carrying Capacity, How Many Bears Can Live in This Forest?), components of habitat (Oh Deer!), and food chains (Deadly Links).

Those WILD activities emphasizing language arts for both elementary secondary students include: Animal Poetry; Does Wildlife Sell Cigarettes (analyzing ads); Learning to Look, Learning to See (improving observation skills); Interviewing a Spider: Cartoons and Bumper Stickers; and Stormy Weather (guided imagery).

After doing several WILD activities, the pre-service teachers were then asked, as a measure of their progress, to brainstorm ways that a cricket could be used to teach environmental education. Their orally given, group effort included the following ideas:

Food chains
Interactions between crickets
Interactions with other small animals
Cricket populations in buildings
Jiminy Cricket character
Study of insects in general
Observe and draw

At night measure temperature by number of sounds made
Observe how make sound
Compare to how other animals communicate
Creative writing
Find out about superstitions
Cricket races
Measure how far jumps
Crickets in literature
Act out being a cricket
Write a poem
Study about as a pest
Find out about different cultural attitudes toward insects

Models of teaching were taught with environmental education examples sprinkled in. These models and suggested sources of examples are as follow:

1. Inquiry - No Water Off A Duck's Back activity from Project WILD.
2. Hilda Taba's inductive thinking strategies - Several lesson plans developed by pre-service teachers are included in this monograph.
3. Guided imagery - Stormy Weather activity from Project WILD.
4. Problem-solving strategy - Ethi-Reasoning activity from Project WILD.
5. Synectics: Free Thinking example in this chapter was done with teachers after outdoor experience.

The strategies described above were used with pre-service teachers preparing to be either elementary or secondary teachers. Those in the elementary education program had additional instruction and assignments relating environmental education to reading and social studies instruction (reviewed in other chapters). They also had the opportunity to view the instructional program at Kimbark Elementary, a magnet school for environmental education in San Bernardino City Unified School District.

The positive results of including environmental education in teacher preparation by these methods is confirmed by the lesson plans developed and taught by the teachers. Samples of these are included in these monograph. Video tapes of several lessons are available. Pre- and post-testing results showing several significant findings for knowledge andattitudes are described in another chapter.

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_____. Environmental Education Guide. Hayward, CA: Office of the Alameda County Superintendent of Schools, 1981.

_____. Project WILD. _____: Western Regional Environmental Education Council, 1984.

SYNECTICS

"FREE THINKING"

Don't worry about rhythming, relatistic matches, or proper metaphors. Write down the <u>first</u> thought that comes into your mind. If it helps, close your eyes when I give you a word.

Examples:

Soft as... a falling leaf
Soft as... fresh made butter
Soft as... a child's sleeping breath
Pretty as... shiny satin ribbon

Try some.

Rough as...	Blue as...	Wild as...
Soft as...	Purple as...	Fun as...
Light as...	Green as...	Lucky as...
Hard as...	Black as...	Dark as...
Warm as...	Red as...	Open as...
Cold as...	Yellow as...	Deep as...
Gentle as...	White as...	Free as...
Tough as...	Brown as...	Simple as...
Wide as...	Grey as...	Special as...
Wonderful as...	Pink as...	Smooth as...

Now go back and place a mark by your answers that correspond to the following three areas. Total for each area.

People Places Things

USING CHILDREN'S LITERATURE TO PROMOTE ENVIRONMENTAL AWARENESS

Darleen K. Stoner
Kathy O'Brien

Children's literature can be used to teach environmental education, either directly or as a springboard to other curricular activities. The following framework can be used to help pre-service elementary teachers view children's literature from an environmental perspective.

The primary goal of environmental education is to develop citizens who are knowledgeable about the environment and involved in working toward a more livable future. Environmental education includes such basic understandings as: (1) people and wildlife have the same basic needs; (2) living and non-living elements are interdependent; (3) people affect the environment while the environment affects people; and (4) people are accountable for their effects on the environment.

Careful selection of literature, in addition to helping students to better understand these concepts, can arouse interest in the environment. Children enjoy reading and listening to stories. The books often help children to understand and appreciate the environment by portraying cause-effect relationships, dealing with limited situations, providing vivid descriptions and accurate pictures, and creative vicariously-experienced siutations. Literature also provides an excellent basis for follow-up activities that reinforce and expand upon the book's meaning.

Children's literature can help provide clear explanations of important concepts, often in narrative form. The story of Bear Mouse (1973) by Bernice Freschet, for instance, offers a clear and detailed explanation of a field mouse's diet, natural predators, habitat, and physical characteristics as it tells the story of a mother mouse searching for food for her babies. Brian Wildsmith's Squirrels (1975) is another good example of clearly detailed information accompanied by beautifully vivid and powerful illustrations:

> Probably no animal in the world uses his tail for so many purposes. When a squirrel leaps through the air from tree to tree, he can use his tail as a parachute, and it even helps him to change direction. And when a squirrel swims, as he does sometimes, he can use his tail as a sail.
>
> And when he scurries along the bough of a tree, he can use it to balance and guide himself.

And when a squirrel sleeps, he wraps his tail around himself like a blanket.

(unpaged)

A book concerned with population and pollution is Bill Peet's Fly Homer Fly (1969). Homer, a pigeon, leaves his country life for what he believes will be a better life - the city and Pigeon Plaza. He finds life is different in the people-created environment, which includes air pollution and high pigeon-population density. Eventually Homer returns to the country. Although this book depicts, perhaps unrealistically, the goodness of country life versus the hostility of the city, it does provide a basis for understanding how the relation of people and animals to the environment is altered due to the construction of urban environments. After reading about Homer, students could discuss both the negative and positive aspects of city and rural life for people and wildlife. How are the basic needs met in each environment? Observation and documentation of local pigeons can provide a good basis for a discussion on their actual behavior versus that portrayed in the book.

Byrd Baylor's books are always beautifully written, sensitive, and poetic writings about relationships between humans and their environments. Two books, illustrated by Tom Bahti, also explore the relationship between past and future by showing how prehistoric Indians in the Southwest left traces of their environment and culture through art. Before You Came This Way (1969) evokes ancient life through examining canyon petroglyphs while When Clay Sings (1972) shows how we can gain knowledge of the past by studying the designs in pottery shards found throughout the desert:

They say that every piece of clay is a piece of someone's life.

They even say it has its own voice and sings in its own way.

(unpaged)

After a discussion about life in the early Southwest and living with the absence of technology, young students could draw murals depicting petroglyphs and pottery designs from the book and write captions or brief texts to accompany the mural. Older children could create their own art designs based on our current environment and culture which could emphasize our technological society. This project could then lead to a discussion projecting the planet's environmental future based on current ecological and technological trends.

Hetty and Harriet by Graham Oakley (1981) portrays the adventures of two hens who search for a perfect place to live. Basic environmental concepts included in this story are: the need for appropriate food and shelter, predator-prey relationships, food chains, and habitats for certain animals. Leaving the safety of the farm, the hens travel through a series of rural environments and narrowly escape being eaten by a fox.

Their arrival in the city prompts a humorous look at the incompatibility between the habits of chickens and the organizational structure of the city environment. The chickens brief stay at an egg production plant and close call with a soup factory provide students with a view of how chickens fit within the food chain for people. This helps students overcome the "supermarket syndrome," whereby they think that everything we buy is manufactured. Activities could include having students compare their own basic needs to those of the hens and draw the hens in appropriate habitats and label with basic components of the habitat (food, water, shelter, space).

A good follow-up to Hetty and Harriet would be Inside an Egg by Sylvia Johnson (1982). Its clear, well-organized, and scientific text describes in detail the development of a chick from fertilization to hatching. Extending the attribute of egg laying to many other animals living in different habitats is the basis of Ruth Heller's Chickens Aren't the Only Ones (1981). This book by Ruth Heller, as well as her others such as Reason for a Flower (1983) and Plants That Never Ever Bloom 1984) offer unique combinations of natural and poetic beauty. The wonders of nature are conveyed through exquisite and realistic illustrations. These books help children develop an appreciation for nature through heightening observational and interpretive skills.

Bibliography

The following children's books are just examples of the countless ones available that could be used to provide a better understanding about the environment to students. Pre-service teachers were required to write book reviews similar to the following.

Aliki. Corn is Maize: The Gift of the Indians. New York, NY: 1976. Thomas Y. Crowell Co.

A "Let's Read and Find Out Science Book" which describes the life cycle of corn. It traces the development of corn from its beginnings in South and Central America and explains its many uses throughout history. Students can discuss own uses of corn in comparison to that of other cultures.

Arnosky, Jim. Drawing Life in Motion, New York, NY: Lothrop, Lee, and Shepard, Co., 1984.

This book illustrates how to draw wildlife and presents it in a way that the reader understands how to become more aware of the motions of nature. The drawing of wildlife promotes observation skills.

Booth, Eugene, and Duck Collard. Under the Ocean. London, England: Macdonald- Raintree, Inc., 1977.

Filled with colorful sea animal pictures, it asks such questions, as: what can you see under the ocean? Which fish do you like best. It also has picture stories and encourages children to tell about each picture, providing a perfect format for a language experience lesson.

Farber, Norma. Never Say Ugh To A Bug. New York, NY: Greenwillow, 1979.

A poetic presentation on the purposes of insects like maggots, honeybugs, wasps and crickets. A very instructional book - even about aphids. Students develop a greater awareness of the ecological importance of these often misunderstood animals.

Keats, Ezra Jack. Over in the Meadow. New York, NY: Four Winds Press, 1971.

A book suitable for the preschool child who is learning how to count. It takes the child from 1-10 using different animals that we might find in a meadow. What really makes the book appealing are the beautiful watercolor pictures that go along with the numbers and the delightful and lyrical way in which the animals of the meadow are presented. Children could be encouraged to observe and count insects and other small animals in the school yard.

Lopshire, Robert. I Am Better Than You. New York, NY: Harper and Row, 1968.

This is a story of two lizards who compete for everything that they do, it introduces the main characteristics about a lizard in a very story-like format. It shows how lizards catch flies, run fast, and are able to change colors. This book would help a child to become more aware of what a lizard does and would relieve some of the fright that a child might otherwise have towards a lizard. How a lizard eats and survives could be related to parallel aspects in a child's life.

Milgrom, Harry. ABC of Ecology, New York, NY: MacMillan Co., 1972.

Each letter of the alphabet is used to represent some aspect of the ecology of our environment. This excellent book is aimed at developing language skills.

Mowat, Farley. Owls in the Family. Boston, MA: Little, Brown & Co., 1961.

An amusing "true" story about growing up with two owls as pets. Set in Saskatoon, the benefits of rural life on the prairie are portrayed through a series of both funny and emotional events. Students could compare and contrast own life styles to that of the author's childhood.

O'Neill, Mary. Hailstones and Halibut Bones. New York, NY: Doubleday & Co., Inc., 1961.

Feelings, events, and sensory experiences are attributed poetically to twelve colors. This book increases the awareness level of the impact of color and improves observation of the environment. It is excellent for linking art with interpretation of the environment.

Peet, Bill. The Wump World. Boston, MA: Houghton Mifflin Co., 1970.

Wump World is invaded by the Pollutians from Pollutus much to the terror of the Wumps. The Wumps hide themselves as the world gets polluted. Finally the Pollutions can't stand the mess themselves and leave. The Wumps hope that time will heal their world. This book provides a good basis for discussing pollution.

Pringle, Laurence. Listen to the Crows. New York, NY: Thomas Y. Crowell, 1976.

Interesting, very readable, and informative book detailing the nature of crow calls. It discusses types of calls, variations of the same calls, ways of studying and recording crow calls, as well as the nature of the birds themselves. The book could improve students' observation of crows.

Scott, Jack Denton and Ozzie Sweet. Return of the Buffalo. New York, NY: G. P. Putnam's Sons, 1976.

This well-documented book traces the mating, birth, and over all life span of the buffalo. It gives an excellent description of the contributions the buffalo made to Native American life and culture, the massive slaughter by the Anglos, and the efforts to save them from extinction. A follow-up discussion could deal with how people are accountable for their effects on the environment.

Wilder, Laura Ingalls. On the Banks of Plum Creek. New York, NY: Harper & Row, 1937.

The daily existence of a frontier family is portrayed. They work the land and fight as a grasshopper plague threatens to destroy their crops. This book takes the reader back to the 1800's and the times of church socials and sleigh rides. Students can compare their own lifestyle with that of a frontier family.

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WILDLIFE EDUCATION AND SOCIAL STUDIES? YES!

Darleen K. Stoner

Student teachers in my curriculum class for elementary social studies have been going WILD! In an effort to assist my students in perceiving the relationship between wildlife and social studies, I developed a list of social studies objectives and correlated them to appropriate activities. Over half the activities in the elementary WILD guide are identified as related to social studies. I also found 4 more activities that need to be identified as social studies applicable, making a spectacular total of 50 relevant activities. The objectives and their match-up to WILD activities are presented here. With 5 of the activities, I've added a key teaching idea which is not given in the WILD guide.

Social Studies Objectives for Project WILD

Students will be able:

1. to utilize basic information-gathering skills.
2. to utilize science process skills.
3. to participate in critical thinking and problem-solving activities.
4. to take social action.
5. to identify personal, everyday decisions that may impact wildlife. (Example question: What acts do I perform that are essentially wasteful and/or harmful to wildlife?)
6. to identify decisions by others that may impact wildlife.
7. to develop citizenship.
8. to realize that decisions must change as circumstances change.
9. to realize that all of us have the same basic needs and experience some of the same problems as wildlife. (This could be applied in a local or global perspective.)
10. to demonstrate the interdependence of plants, animals, and non-living elements whether in a built or natural environment.
11. to identify negative (and positive) consequences to wildlife resulting from our actions.
12. to become familiar with wildlife-related careers.
13. to keep abreast of current events relating to wildlife issues.

Note: Objectives 1 and 2 are considered to be used within all activities. These two objectives have only been identified with WILD activities where they are the only ones applicable.

Social Studies Objective Nos.	Wild Activities in Elementary Guide
9	Bearly Born
9, 11	Grasshopper Gravity Emphasis: Observation is a basic skill!
9	Microtrek Scavenger Hunt
1	Stormy Weather Guided imagery is an excellent technique for children to "see" from another's perspective or to "experience" a situation.
9, 10	The Beautiful Basics
9	Everybody Needs a Home* Idea: Students identify basic needs and then compare the way their needs are/were met by another group (Pilgrims, Indians, etc.)
9	Habitracks
9	What's That, Habitat?
10	What's for Dinner* Idea: Students generalize that Pueblo Indians (or other group) depend on plants, either directly or indirectly, for food. Is this any different than us?
3, 5, 6, 7, 11	Litter We Know
10	Museum Search for Wildlife
10	Seed Need
9, 10, 11	Environmental Barometer
8, 10	Make A Coat
9	What Bear Goes Where* Idea: After doing activity, children draw and discuss own living conditions. The children will compare and contrast how their basic needs are met.

10, 11	Urban Nature Search
9	Polar Bears in Phoenix?
9, 10, 11	Classroom Carrying Capacity
5, 9, 10, 11	How Many Bears Can Live in This Forest? Idea: After doing activity, ask students, "What acts do we perform that make our classroom environment a less pleasant place to live and to do our job as students?"
3	Visual Vocabulary* This method is very useful for reviewing vocabulary and concepts.
9, 10	Rainfall and the Forest
10, 12	Wildwork
6, 8, 9, 10, 11	Oh Deer! Idea: What causes some fluctuations in human populations? (Loss of jobs, economic growth, potato blight and resulting famine that promoted immigration of Irish to U.S.A., etc.)
6, 10, 11, 13	Here Today, Gone Tomorrow What human cultural aspects are endangered or extinct?
8, 10, 11	Smokey the Bear Said What?
6, 8, 9, 10, 11	No Water Off A Duck's Back
6, 8, 10, 11	The Hunter
6, 9, 10, 11	Saturday Morning Wildlife Watching
3, 5, 6, 9, 11, 13	Cartoons and Bumper Stickers
3, 5, 6, 11, 13	Does Wildlife Sell Cigarettes?
5, 6, 13	The Power of a Song
5, 6	Wildlife in National Symbols
3, 6, 8, 13	Changing Attitudes

2	Learning to Look, Looking to See
8, 10, 11	Too Close for Comfort
8, 10, 11	Shrinking Habitat
3, 6, 8, 10, 11	Migration Barriers
3, 6, 8, 11	To Zone or Not to Zone
6, 8, 10, 13	Deadly Links
5, 6, 8, 10, 11	Keeping Score
5, 6, 8, 9, 10	Planning for People and Wildlife
11	Ethi-thinking
3, 4, 7, 11	Playing Lightly on the Earth
5, 8, 11	Water's Going On?!
5, 8, 10, 11	What Did Your Lunch Cost Wildlife?
5, 8, 10, 11	Flip the Switch for Wildlife
3, 5, 6, 10, 11	Ethi-reasoning
3, 4, 5, 7	Can Do!
3, 4, 5, 7	Improving Wildlife Habitat in the Community
3, 4, 5, 6, 7, 11	Enviro-ethics

*Not listed as a social studies activity in WILD guide but is of considerable value

EVALUATION OF KNOWLEDGE OF AND ATTITUDE TOWARD ENVIRONMENTAL EDUCATION

Darleen K. Stoner

A 40-item instrument to assess the growth in knowledge of and attitudes toward environmental education was constructed. Emphasis was given to wildlife aspects since Project WILD was used as a text. Several of the questions were identical to or modifications of those used in the original field testing of the Project WILD materials.

Each item on the instrument was included based on the assumption that it was relevant to one of the following groupings:

a. knowledge of ecological concepts/terms (items) 1-15, 17, 18, 24, 28, 30, 32).
b. attitudes of fear and hate of certain animals (items 16, 19, 23, 34).
c. attitudes toward teaching environmental education (items 21, 22, 26, 29, 39).
d. attitudes toward the environment (items 25, 27, 31, 35, 37, 38, 40).
e. personal choice activities done for aesthetic pleasure (items 20, 33, 36).

The instrument was administered on the first day of class in September and again on the last day of class in December. The post-test therefore was done after most of the classroom instruction was given along with the completion of the outdoor school, but before the beginning of the actual student teaching. Thirty pre-service teachers were tested, with an equal division between those preparing to elementary or secondary teachers.

Each item was analyzed with a t-test for significant change between pre- and post-testing using the Statistical Package for the Social Studies (SPSS). Growth in knowledge and attitude was significant on several items, especially for those preparing to be elementary teachers. These are displayed in a table.

SIGNIFICANT CHANGES FOR ALL PRE-SERVICE TEACHER (n=30)

Items	t-value	Probability
1-15 as a group	-2.07	*
18	3.00	**
35	2.04	*
39	6.75	***

SIGNIFICANT CHANGES FOR ELEMENTARY PRE-SERVICE TEACHERS (n=15)

Items	t-value	Probability
1-15 as a group	-3.01	**
18	2.65	*
20	2.17	*
24	2.10	*
29	2.45	*
37	2.65	*
39	6.44	***

SIGNIFICANT CHANGES FOR SECONDARY PRE-SERVICE TEACHERS (n=15)

Items	t-value	Probability
18[1]	2.17	*
39	4.00	**

[1]when n=12 due to excluding those preparing to be science teachers

* $p \leq .05$
** $p \leq .01$
*** $p \leq .001$

In considering the original groupings of items, the elementary pre-service teachers tended to show significant growth in knowledge about ecological concepts and terms (items 1-15, 18, 24) with the secondary only showing significant change on item 18. Both elementary and secondary students showed a significant positive change in their response to item 39 related to attitude toward teaching environmental education ("I know how to incorporate environmental education into the curriculum I will be teaching to students"). Elementary pre-service teachers also increased significantly on item 29 related to incorporating environmental education into lessons for students. Change in attitude toward the environment was demonstrated by the responses to items 35 and 37. For a personal choice activity, elementary pre-service teachers increased in their interest in reading books about wild animals (item 20).

The test results support the effectiveness of including environmental education in a pre-service teacher programs. Growth in knowledge and attitude was demonstrated in several areas. Especially encouraging was the feeling expressed by students that they know how to incorporate environmental education into the curriculum. The growth demonstrated by the elementary pre-service teachers reflected their increased time spent on relating individual subject areas, such as reading, to environmental education.

DIRECTIONS

This is to assess your knowledge of and attitudes toward the environment and environmental education. Please do the best you can to answer the questions. We will not use the results as part of your grade. Please put your name on the answer sheet. Do not write on this questionnaire.

True or false. On the answer sheet, cirlce 1 if you think the statement is true. Circle 2 if you think it is wrong.

1. There is wildlife living in this building.
2. All endangered, threatened and rare species can be saved if we spend enough money for research and management.
3. In the city, there is not real wildlife living.
4. Animals and people have the same basic needs for survival.

The next questions are multiple choice. Please read the question and circle the number on the answer sheet which shows the answer that you think is best.

5. Unless disturbed by humans, a natural population over several years will tend to
   1. get smaller every year
   2. get larger every year
   3. some years be larger and some years be smaller
   4. become extinct

6. On the San Bernardino campus, I guess that there are
   1. One to two types of animals
   2. Three to ten types of animals
   3. Ten to twenty types of animals
   4. Over twenty types of animals

7. Which of the following animals would most likely be caught by a predator?
   1. a brightly colored animal
   2. a fast moving animal
   3. an animal that stands perfectly still
   4. an animal that eats at night

8. Which list could best be combined to make a food chain?
   1. grass, bushes, trees
   2. people,cows, horses
   3. eagles, grass, rabbits
   4. pigs, cows, chickens

9. In a mountain valley, a balance exists between the number of coyotes and the number of rabbits. Suddenly all the coyotes disappear.
   1. Every year the number of rabbits will keep getting larger.
   2. The number of rabbits will not change
   3. The number of rabbits will increase, but only for a few years.
   4. Most of the rabbits will die right away.

10. The most common reason for animal extinction in the modern world is
   1. Habitat loss
   2. Competition with other animals
   3. Hunting
   4. Pollution
   5. Predation

11. An animal species which could disappear forever is called
   1. threatened
   2. rare
   3. extinct
   4. endangered

12. The yucca plant and yucca moth have a relationship of mutualism. If all the moths were to die, which of the following results would be the most likely?
   1. There would be more yucca plants.
   2. Most yucca plants would eventually die
   3. Yucca plants would not be affected.
   4. Yucca plants would grow larger.

13. The combination of food, water, shelter, and space in a suitable arrangement is called
   1. habitat
   2. adaptation
   3. food chain
   4. niche

14. Making a stream a lot warmer (at least 10 degrees F) is
   1. helpful to all plants and animals in the stream
   2. helpful to some plants and animals in the stream and harmful to others.
   3. harmful to all plants and animals in the stream.
   4. harmful to the plants but helpful to the animals.

15. Spraying crops and trees with chemical insect poisons increases crop yields and protects the worlds food supply. Nevertheless, many people insist that use of insect poisons should be prohibited. Why do these people oppose the use of insect poisons?
   1. The number of insects usually increases after each spraying.
   2. Only insects are affected and other pests are not.
   3. The cost of spraying is greater than the savings in food.
   4. Poisons accumulate in food chains.

You should respond to the next statments by marking the number that best agrees with your feelings. You have five choices:

1 = strongly agree
2 = agree
3 = I'm not sure
4 = disagree
5 = strongly disagree

16. Spiders are important animals.
17. Forest fires should always be put out.
18. If I found a healthy fawn (baby deer) in the forest, I would try to take it to a place where people could take good care of it.
19. I think all rats and cockroaches should be killed.
20. I like reading books about wild animals.
21. A moral obligation of teachers is to prepare students to deal with environmentally related problems.
22. Environmental education should be included in the school curriculum.
23. Poisonous snakes and insects that could hurt people should be killed.
24. Native plants are valuable.
25. I would like to learn more about environmental education.
26. I think other people should know more about the environment.
27. We should be able to use the environment as we wish.
28. There are plenty of places in the world for wildlife.
29. I would like to incorporate environmental education into the curriculum I will be teaching to students.
30. We should kill all coyotes to protect rabbits and calves.
31. I would like to do more to help our environment.
32. People should share the world with wildlife.
33. I like watching T.V. shows about wild animals.
34. I sometimes watch spiders just for fun.
35. I feel responsible for what happens to the environment.
36. Watching birds would be a waste of time for me.
37. What other countries do with their environment is none of our business.
38. If I had the opportunity I would be involved in an issue that affects the environment.
39. I know how to incorporate environmental education into the curriculum I will be teaching to students.
40. It really isn't my responsibility to take care of the environment. We have scientists and other people to do that.

OUTDOOR SCHOOL

Darleen K. Stoner

What does it take to develop within pre-service teachers the desire to include environmental education in their classroom teaching? The best way is participation in an outdoor experience. Even a brief outdoor education program exposes these teachers-to-be to concepts, skills and attitudes that can best be learned in that setting. It also provides a motivating experience which promotes understanding and appreciation for environmental concepts that can be included in regular classroom instruction, both at the elementary and secondary levels.

Environmental education is multifaceted and includes the biophysical, aesthetic, social, economic, and political aspects. This outdoor school demonstrates that all these aspects can be addressed and experienced within two days. Interdisciplinary activities that are biophysical and aesthetic in nature are emphasized, along with a liberal sprinkling of social experiences, and a culminating simulation related to future use of the outdoor school site. Students used a handout developed specifically for this program which includes all curriculum areas.

The following components of the outdoor shcool are provided:

1. Map to outdoor school and list of items to bring.
2. Schedule of activities at outdoor school.
3. Environmental Education Program used at outdoor school.
4. Sample of newspaper produced by pre-service teachers.

A video based on this outdoor school entitled "Glimpses of An Outdoor School for Pre-Service Teachers" is available.

ACTers -

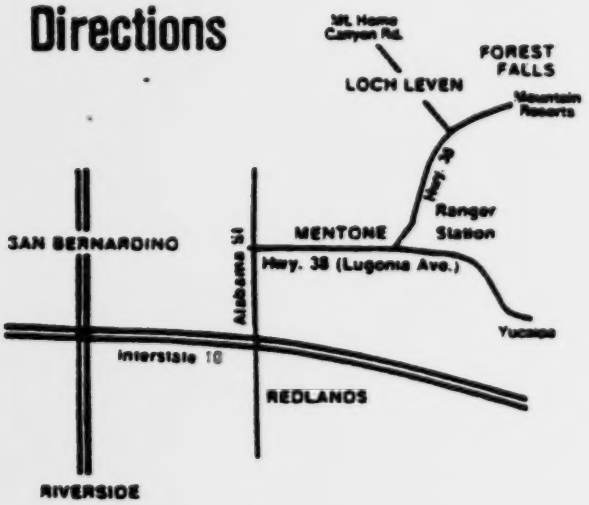
Arrive at 1:30 p.m., November 22.
We'll be taking a hike before occupying the cabins.

LOCH LEVEN CONFERENCE GROUNDS

Bring with you:
- sleeping bag or blankets and sheets
- outdoor clothing and shoes
- jacket
- PJ's, bathrobe, slippers
- personal hygiene items
- towel
- plastic bag
- pencil/pen
- paper
- camp book
- Project WILD book

Recommended also:
- flashlight
- pillow
- binoculars
- towel or blanket to sit on outside
- camera and film
- musical instruments
- gloves
- hat
- thin T-shirt for leaf printing
- hammer, newspaper

Directions



(714) 794-2507

From Los Angeles, take the San Bernardino Fwy EAST (I-10) to Redlands. Exit at Alabama Street off-ramp. Turn LEFT (north) on Alabama (under the Fwy) and turn RIGHT (east) on Lugonia Street (which becomes Hwy 38, "To Mountain Resorts"). Continue through Redlands and the city of Mentone 12.24miles to Mountain Canyon Road turn LEFT. The parking lot is 1/2mile after leaving Hwy 38.

SCHEDULE OF ACTIVITIES AT OUTDOOR SCHOOL

Friday

1:30 Arrive
1:45 Nature Walk, including creative writing
3:15 Plant pounding art
3:45 Check into cabins
4:15 Journal writing/exploring
5:00 Be here - dining room area
5:15 Hoppers
5:30 Dinner
6:30 Talk on Environmental Education by
Dr. Amer El-Ahraf, CSUSB
8:00 Campfire
later: Skits, singing

Saturday

7:45 Hoppers
8:00 Breakfast
9:00 Pack-up/clean cabins
9:30 Visits museum
10:00 Nature walk
11:00 Math: Community walk
11:30 Designing birds
12:15 Hoppers
12:30 Lunch
1:30 Sharing of birds
1:45 Analyzing a typical problem
2:30 Say "good-by" to Lock Leven

ENVIRONMENTAL EDUCATION PROGRAM

NOVEMBER 22-23, 1985

for

Pre-Service Teachers

in

Alternative Credential Track

California State University

San Bernardino

Prepared by Darleen K. Stoner, Ph.D.

A Point of View *

The primary goal of environmental education is to develop citizens who are knowledgeable about the environment and involved in working toward a more liveable future. This goal is based on the following assumptions:

- **The environment is not only biophysical; it is also aesthetic, economic, social, and political as well.**
- **Environmental education must promote an environmental ethic where people are not exploiters of the environment but are stewards concerned with the preservation of all life systems.**
- **Environmental education must reflect a commitment to future generations, not merely perpetuate the values of the past.**
- **Environmental education is not a subject, but a synthesis of concepts and skills from all disciplines that relate to the environment.**
- **"A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends to do otherwise." (Aldo Leopold)**

* Environmental Education Guide, Office of the Alameda County Superintendent of Schools, 1981.

A newsletter will be developed based on your contributions. Be sure to indicate your contribution.

DAY ONE

MY FEELINGS ABOUT THE TRIP TO CAMP ARE:_____

THE MOST INTERESTING THING I SAW TODAY.....

OTHER COMMENTS:_____

DAY ONE

VISUAL OBSERVATIONS:

DAY TWO

FROM TODAY, I WOULD LIKE TO REMEMBER: _____

DAY TWO

VISUAL OBSERVATIONS:

PLANT COMMUNITIES

I. Woodland ecosystem

Description:

Soil sample description:

Air temperature:

Identify California Laurel (Bay)
Poison Oak
Big Leaf Maple

II. Chaparral

Description:

Soil sample description:

Air temperature:

Identify Buckthorn (small leaves, light color)
Chamise (small leaves)
Manzanita (red bark)
Wild Buckwheat (small, thick leaves, light colored)
Yerba Santa (thick, waxy leaves)
Yucca (thick coating on leaves, water storage in stems)
Scrub Oak (small, thick leaves)

III. Riparian

Description:

Soil sampe description:

Air temperature:

Identify Stinging Nettles (formic acid, edible when cooked)
Mugwort (silver underside leaf)
White Alder (deciduous, shallow root system)
Sycamore (deciduous, puzzle-bark)
Water cress (edible, grows in water)
Willow

PLANT COMMUNITIES - continued

Related learnings include
- ecosystem
- adaptations
- photosynthesis
- soil components
- fire ecology
- evergree
- deciduous
- erosion
- watershed
- man's impact
- soil compaction

Sketch 2 plants. Show as many details as possible.

This is _____

This is _____

HISTORICAL/CREATIVE WRITING

In 1913, Harold Bell Wright wrote a book called Eyes of the World. It was written in a tiny log cabin located along the Mill Creek road. Some passages in the book describe this area. Consider the following:

> Their road led always upward, with a gradual, easy grade; and by noon they had left the cultivated section of the lower valley for the higher, untilled lands. The dark, glossy-green of the orange and the lighter shining tints of the lemon groves, with the rich, satiny-gray tones of the olive-trees, were replaced now by the softer grays, greens, yellows, and browns of the chaparral. The air was no longer heavy with the perfume of roses and orange-blossoms, but came to their nostrils laden with the pungent odors of yerba santa and greasewood and sage. . . . Before them, the San Bernardinos drew ever nearer and more intimate - silently inviting them; patiently, with a world old patience, bidding them come; in the majestic humbleness of their lofty spirit, offering themselves and the wealth of their teaching.
>
> So they came, in the late afternoon, to that spot where the road for the first time crosses the alder and cottonwood bordered stream that, before it reaches the valley, is drawn from its natural course by the irrigation flumes and pipes.
>
> The sound of the mountain waters leaping down their granite-bouldered way reached the men while they were yet some distance. . . . Czar was already ranging along the side of the creek - sending a colony of squirrels scampering to the tree tops, and a bevy of quail whirring to the chaparrel in frightened flight. . . .
>
> . . .blankets spread within sound of the music of the stream; a watching of the sun's glorious going down; a quiet pipe in the hush of the mysterious twilight; a "good night" in the soft darkness, when the myriad stars looked down upon the dull red glow of their camp-fire embers; with the guarding spirit of the mighty hills to given them peace - and they lay down to sleep at the mountain's feet.
>
> . . .A heavy fog, rolling in from the ocean in the night, submerged the valley in its dull, gray depths, leaving to the eye no view but the view of the mountains before them, and forcing upon the artist's mind the weird impression that the life he had always known was a fantastically unreal dream.
>
> And now, as they approached, the frowning entrance of Clear Creek Canyon grew more and more clearly defined . . . On either hand, the walls rose almost sheer, while their road, now, was but a narrow shelf under the overhanding cliffs, below which the white waters of the stream - cold from the snows so far above - tumbled impetuously over the boulders that obstructed their way - filling the hall-like gorge with tumultuous melody. Soon, the canyon narrowed to less than a stone's throw in width. The walls grew more grim and forbidding in their rocky nearness. . . .

. . .The cliffs seems to draw apart, and, through the way thus opened, they saw the great canyon and the mountains beyond. It was as though a mighty, invisible hand rolled silently back those awful doors to give them entrance.

Abruptly, upon the inner side of the narrow passage, the canyon widens to many times the width of the outer vestibule; and the road,crossing the creek, curves to the left; so that, looking back as they went, the two men saw the mighty doors closing again, behind them - as they had opened to let them in. . . .

Clear Creek Canyon is a deep, narrow valley, some fifteen miles in length, and approaching a mile in its greatest width; lying between the main range of the San Bernardinos and the lower ridge of the Galenas. The lower end of the canyon is shut in by the sheer cliff walls, and by the rugged portals of the narrow entrance; the upper end is formed by the dividing ridge that separates the Clear Creek from the Cold Water country which opens out onto the Colorado Desert below San Gorgonio Pass and the peaks of the San Jacintos. Perhaps two miles above the entrance, the canyon widens to its greatest width; and in this portion of the little valley, which entends some fives miles to where the walls again draw close, located on the benches above the boulder-strewn wash of Clear Creek, are the homes of several mountain ranchers, and the Government Forest Ranger Station. (pages 178-182)

If you were a writer describing this area, would you have a similar description?

How would yours be different?

Considering your specialized training, how could you get your own students involved in interpreting this area (or another area)?

I encourage you to write your own description of this area.

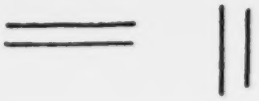
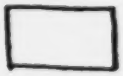
LEAF PRINTING WITH MORDANTS

1. Use all cotton cloth (wash first)
2. Use plants parts (leaves, stems, flowers)that are soft.
3. Put plants between two cloths. Lay on top of newspaper. Pound gently with hammer.
4. Pick all plant material off of cloths.
5. Put cloths in a solution of 3 T ferrous sulfate per gallon of water (or use alum for a less brilliant color set) Leave for 1 - 2 minutes.
6. Rinse in water
7. Put cloths in solution of 3 T washing soda (Arm and Hammer) to 1 gallon water
8. Rinse
9. Let dry.
10. Later iron and mount as you please.

(Note: you can stop after step 4 and dye set at a latter time. This is great if you are on a trip.)

Name_____

COMMUNITY WALK - WHAT DO YOU SEE?

Line	Parallel lines 	Perpenticular lines	line segment
Ray	Triangle	Square	Rectangle 
Circle	Parallelogram	Trapezoid	Octogon
Pyramid	Cone	Cylinder	Cube

How Birds Get A Living*

Food, water and shelter are three important things that both you and a bird need in order to live, but the way you each get these are very different.

People's hands are probably their most important tools in getting their living. They use them to grow and transport their food, to transport their water and to build their homes. A bird has no hands but that doesn't bother it a bit. Its bill, its feet, its wings and tail—even its keen eyesight—all help to solve its living problems.

You use your mouth for eating and drinking, after your hands have done their job in getting food and water to that point. Birds also use their bills for eating and drinking but many of them first use their bills to CATCH their food. You use your hands to build a house. Here, again, a bird uses its bill to build its nest.

Many birds use their feet to walk, run or hop, just as you do, but some of them also use their feet to tramp down nesting material when building their nests. Ospreys use their feet for catching fish. Chickens, grouse and pheasants scratch for food with their feet. Many birds of prey carry nesting material in their talons.

When people want to get food from a long distance they must rely on trucks, trains, boats or airplanes. Most birds only need to set their wonderful wings and tails in motion and off they go to find their dinner. Eagles and a few other birds have such good eyesight that they can spot a meal a mile away. Could you see an ice cream cone that far off?

BIRD BILLS are used for getting food, constructing nests, dressing feathers and as defense weapons.

Seed-eaters (sparrows, cardinals, etc.) have short, thick bills for cracking open tough seeds.

Quail, chickens, etc., have short horny bills for picking up seeds and insects from the ground.

Swallows, flycatchers, etc., that catch insects on the wing, usually have small bills and wide mouths.

Woodpeckers, that bore into trees for grubs, have long, sharp, chisel-like bills.

Insect-eaters (warblers, vireos, kinglets, etc.) have slender, pointed bills.

Nectar-eating hummingbirds use their long, slender, tapering bills for probing into deep flower tubes.

Mud-feeders (some ducks and geese) have broad, flattened bills for pushing into mud and straining out food from it.

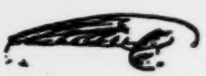
Long, sharp bills of herons, kingfishers, etc., are well-adapted for catching fish.

*a handout from the Audubon Society

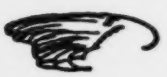
Birds of prey (hawks, eagles, owls, etc.) have sharp, hooked bills for tearing animal food.

BIRD WINGS: These are their organs of flight, and there is a close relation between the shape of the wings and birds' style of flight.

Swallows, swifts, etc., have long pointed wings for speedy, skimming flight when pursuing flying insects.



Short, rounded wings of many ground birds (quail, pheasants, etc.) provide for quick take-off and short rapid flight when danger is near.



Most birds of prey (hawks, eagles, etc.) have long, broad wings for strong, soaring flight.

BIRD FEET are adapted for food-getting, defense weapons and locomotion, and sometimes for building nests. Birds usually have three or four toes on each foot. They NEVER have five.

Wading birds (herons, etc.) have long legs and long, slender toes.

Feet of perching birds (robins, sparrows, warblers, etc.) have tendons that automatically lock the bird to its perch while sleeping.

Swimming birds (ducks, geese, swans, etc.) have large webbed feet.

Climbers (woodpeckers, etc.) have spreading toes with strong, curved claws.

Birds of prey (hawks, owls, eagles, etc.) have powerful legs and strong feet with sharp, hooked talons for grasping and carrying their prey.

Ground-feeders (quail, chickens, etc.) scratch for food with their three forward-pointing toes. The small hind toe is raised above the level of the front toes.

BIRD TAILS come in a variety of sizes and shapes. Their main functions are to act as rudders in flight and brakes for stopping.

The erratic, graceful skimming flight of a barn swallow is made possible by its long forked tail.

The stiff tail of a woodpecker acts as a prop when it climbs a tree trunk.

You can spot such birds as brown thrashers, mockingbirds and catbirds by their long, rounded tails.

Many chicken-like birds, such as grouse and quail, often have wide, rounded tails.

Draw a make-believe bird. Before you draw your bird, answer these questions.

1. How does it get its food?

2. How does it fly?

3. Where does it live?

The bird you design must have "parts" that fit its way of living. After you complete your drawing, write a name for your bird.

ANALYZING A TYPICAL PROBLEM*

Just suppose that this area of natural beauty was threatened. Fill-in the blanks in the following story. Note that many areas of the curriculum intertwine.

A CLASSIC CONFRONTATION IN CALIFORNIA: CITIZENS MOVE TO SAVE _____

One of the nation's most dramatic environmental struggles has entered a tense, crucial stage in California. At issue is the future use and appearance of the magnificent _____.

In the name of economic needs and progress, various _____ _____ wish to _____. At odds with _____ are many conservationists and others who seek greater protection of _____'s natural beauty, its recreational potential, and its resource values.

Public reaction to physical threats against _____ has been strong. When the Save_____ Association was founded in _____, it took two important steps. First it prompted a study by _____. The result of this study was a book, _____, which was published in _____. The book effectively dramatized the threats to _____ and served as a beacon for subsequent efforts to protect _____. Second, the group enlisted the support of an aggressive and influential legislator, _____ _____, Aided by the study and increasing pressure from the public and the press, this legislator pushed through a bill creating a _____ to make an official study of the _____ problem. The _____ recommended that _____ be protected and that a regional plan for its management be prepared.

Now for almost _____ people who live near _____ and for _____ of visitors, the _____ is a beautiful and refreshing open space as well as a source of recreation. _____ _____, with it many square miles of _____, supports _____.

Sciences (biology, economics, mineralogy)
Social studies (geography, pol. sci., planning)
Humanities (aesthetics, ethics)
Research (inquiry)
Political action
Legislative process
Lobbying
Planning
Social responsibility
Aesthetics
Values
Biological study

(The above is based on an abridged report concerning action to save San Francisco Bay.)

*This exercise was adapted from "A Classic Confrontation in California: Citizens Move to Save San Francisco Bay" in Ekistics, California Department of Education, 1973.

ANALYZING A TYPICAL PROBLEM - continued

Considering the age level (and subject matter) of the students you plan to teach, what could you include in your curriculum to help them better understand ecological issues?

Grade_____ Subject_____

Suggestions:

A CONCEPTUAL FRAMEWORK IN EKISTICS (defined as the study of the ecology of human beings in settlements or communities)

Extracted from Ekistics, Calif. State Dept. of Education, 1973

Which of these were related to outdoor school?

You may wish to consider these concepts when developing your environmental education lesson.

In the 6 levels, remember the following:

Conceptual Pathway A - Sciences - Man is interdependent with his natural and physical environment.

Conceptual Pathway B - Social Sciences - Man's social behavior is basic to maintaining, altering, adapting, or destroying the environment.

Conceptual Pathway C - Humanities - Man utilizes his symbolic and oral traditions to maintain or alter the environment.

INTERACTIVE CONCEPTS FOR LEVEL 1

Pathway A Interdependence – In Interchange of Matter and Energy	Pathway B Interdependence – In Social Interaction	Pathway C Interdependence – In Cultural Components and Forms
Level 1. In any environment, living things have similar needs.	Level 1. Men live in different environments.	Level 1. Men interact mentally and emotionally to the objects and events in their environment.
1. Green plants, growing in sunlight, make the food they need.	1. Man needs food, sleep, shelter, and clothes.	1. Beauty is a matter of personal opinion. Man develops his own criteria for beauty from the things he sees in his own environment.
2. Animals need green plants for food.	2. A family can provide each individual with these necessities; however, this task is made easier when families share with the community.	2. Feelings about environment may be expressed through art, music, dance, literature, or drama.
3. Man needs plants for food.	3. Members of a family help each other.	3. Man creates works of art that evoke happiness, sadness, anger, or fear.
4. Plants need sun, minerals in the soil, air, and water.	4. Families depend on the help and talents of others in the community.	4. Visual representations of local environment evoke feelings that may lead to community action concerning the environment.
5. Animals need food, air, and water (also exercise and sleep).	5. Man adapts himself to many different environments.	
6. Most plants are dispersed in the environment by seeds.		
7. Animals are alike in many ways.		

INTERACTIVE CONCEPTS FOR LEVEL 2

Pathway A Interdependence – In Interchange of Matter and Energy	Pathway B Interdependence – In Social Interaction	Pathway C Interdependence – In Cultural Components and Forms
Level 2. There are different environments, each with characteristic features and life.	Level 2. Men develop different modes of adaptation to life in different environments.	Level 2. Men seek out objects, events, and behaviors symbolic of beauty.
1. Plants and animals can live and grow only where their requirements for food, water, air, and sunlight are met.	1. Many people in tropical zones hunt and gather food in their immediate surroundings.	1. Exploration of local environment can lead to a collection of beautiful (and ugly) objects.
2. Living things make up communities.	2. People in tropical zones often wear light clothing and construct houses that are open to the surroundings because keeping warm is not a problem.	2. Pleasant environments may be created by adding or subtracting items.
3. Certain plants and animals are found together in communities.	3. People in tropical zones often use the raw materials found in their immediate environment to build houses and tools.	3. Noise is a form of pollution that can be reduced through community effort.
4. The city is a community where people live and work alongside one another.	4. Men living in modern cities are able to modify their environment in many ways.	4. Discarded objects may have artistic potential in the form of "junk" art.
5. In the city community some animals and plants are cared for by people.		

INTERACTIVE CONCEPTS FOR LEVEL 3

Pathway A Interdependence – In Interchange of Matter and Energy	Pathway B Interdependence – In Social Interaction	Pathway C Interdependence – In Cultural Components and Forms
Level 3. Life and environment interchange matter and energy.	Level 3. Men utilize the environment to secure their needs.	Level 3. Men, responding to special environments, create objects and events symbolic of their interaction.
1. Man consumes plants and animals.	1. Wherever man lives he harvests natural resources, which may not replenish themselves.	1. Man's many relationships between his goals and his creative results may be viewed through illustrations of the architectural and landscape designs in his immediate environment.
2. Plants and animals in the environment often have alternative sources of food. All of the various interdependencies in a community are called a food web.	2. Wherever man lives he takes from the environment.	2. Man invents new terms and symbols for new discoveries.
3. A specific predator-prey relationship forms a food chain.	3. People in highly developed countries utilize most of the earth's materials.	3. Man may "reproduce" old cultural patterns by creating new dances based on ecological needs.
4. Changes in the environment, including pollution, may affect food chains.	4. The child produces little of the necessary materials and foods he needs. He is dependent on others. Later, when he may produce necessary things for society, he remains interdependent with the rest of society for his food, clothing, and shelter. He is also interdependent socially.	4. An understanding that objects are created in response to special environments may be developed by a study of pottery and decorations of different cultures.
5. Some agents of pollution may be concentrated in the upper levels of a food pyramid.		
6. Energy is the ability to do work.		

INTERACTIVE CONCEPTS FOR LEVEL 4

Pathway A Interdependence – In Interchange of Matter and Energy	Pathway B Interdependence – In Social Interaction	Pathway C Interdependence – In Cultural Components and Forms
Level 4. Life converts matter and energy into characteristic species form.	**Level 4. Men interact to utilize the world's available resources.**	**Level 4. Cultures are characterized by their special ways of reacting to the environment.**
1. Living things return matter to the environment.	1. With increased use of available resources, man has shifted from rural to urban living.	1. Musical instruments are products of the environment.
2. Living things are dependent on the environment they live in.	2. Man's relation to his environment has been altered due to urbanization.	2. Money forms are related to the environment.
3. All living things are dependent on sunlight as a source of energy.	3. Man has learned to utilize his natural resources.	3. The relationship between beauty and value may be illustrated by analyzing objects in the immediate environment.
4. Cells vary according to the functions they perform.	4. Man must conserve and protect his natural resources.	4. Unique uses of materials available in the environment lead to the development of special architectural forms.
5. Some nongreen plants get their energy from sources other than sunlight.	5. Men may live in similar environments but have different ways of living.	5. Dance and music forms reflect the important cultural aspects of the environment in which they were developed.
6. Life cycles of living things are adapted to specific environments and habitats.	6. Resources are available in different quantities throughout the world.	
7. Many different kinds of animal and plant communities exist.		

INTERACTIVE CONCEPTS FOR LEVEL 5

Pathway A Interdependence – In Interchange of Matter and Energy	Pathway B Interdependence – In Social Interaction	Pathway C Interdependence – In Cultural Components and Forms
Level 5. The environment is and has been in constant change.	**Level 5. Social aims determine the utilization of resources.**	**Level 5. Men create objects, events, and behaviors that nurture their images of beauty and order.**
1. Living things depend upon a carbon dioxide-oxygen cycle. The oxygen cycle can be interrupted by removal of green plants.	1. Man used exploration as a way of supplementing the available natural resources.	1. Man developed mythology and other literary forms to explain natural phenomena. Man can make up his own ecological mythology.
2. As the environment changes, the food webs change.	2. The values of a society affect the utilization of its natural resources.	2. Festivals were created by man to celebrate natural events (harvesting of crops, rainfall, winter solstice, and so forth).
3. The water cycle effects changes in the environment.	3. The availability of natural resources has influenced historical events.	3. Calendars were developed to satisfy man's need for order.
4. The environment is changed and/or maintained by the decomposition cycle.	4. An emphasis on a high rate of productivity leads to an accelerated depletion of natural resources.	4. Art, art forms, and decorations often reflect natural things in the environment.
5. Each environment goes through a succession of predictable changes.	5. Societies develop different ways of conserving, recycling, or destroying natural resources. The ways developed are dependent upon the social aims of the particular society.	5. Primitive dances reflected man's concept of nature and provided a positive outlet for negative feelings.
6. Forces of weather and mountain building are continually changing the earth's biomes.		

INTERACTIVE CONCEPTS FOR LEVEL 6

Pathway A Interdependence – In Interchange of Matter and Energy	Pathway B Interdependence – In Social Interaction	Pathway C Interdependence – In Cultural Components and Forms
Level 6. Man is the prime agent of change of the natural environment.	Level 6. Man modifies the environment in order to utilize his resources and to increase them.	Level 6. Men recreate their environment.
1. Technological advancement has increased man's ability to control the natural environment.	1. Man builds cities near natural resources. Urbanization has enabled man to concentrate human and natural resources for more efficient use.	1. City planning reflects man's need to create a pleasing environment (parks, malls, open spaces, and so forth).
2. Man, through his technology, has converted natural resources into other forms.	2. Man has pumped water into arid regions in order to utilize more land.	2. Man recreates natural environments in his home (aquariums, window boxes, and so forth).
3. Mining of natural resources has led to the destruction of some natural environments.	3. Man changes the natural terrain to build housing sites.	3. Music and poetry evoke feelings about man's natural environment.
4. Disposal of waste products is affecting the natural environment.	4. Man converts the grasslands into grazing lands.	4. Authors use "nature" similes and metaphors to illustrate meanings.
5. Through water and air pollution and over-use of land, man has changed the natural environment by upsetting the balance of nature.	5. Man builds dams and reservoirs to increase his water and energy supply.	5. Man has learned to create a pleasing climate indoors.
	6. Man sometimes destroys the environment in order to mine natural resources.	

SUGGESTED PERFORMANCE OBJECTIVES FOR CONCEPTUAL PATHWAY A

Level 1. Observe similarity of self to other organisms.
Level 2. Share a beginning understand of the nature of different environments. (construct different environments in pots or terraria)
Level 3. Demonstrate the interchange of matter and energy. (experiments to show basic needs of plants)
Level 4. Distinguish the food requirements of different organisms.
Level 5. Describe a variety of changes in the environment.
Level 6. Evaluate environmental changes initiated by man. (sources of water in the community; sources of smog)

SUGGESTED PERFORMANCE OBJECTIVES FOR CONCEPTUAL PATHWAY B

Level 1. Identify different human environments.
Level 2. Analyze different adaptations of men in their habitations. (build igloo, dams, wells)
Level 3. Identify and describe a variety of resource uses of man. (make models of forest, ranch, farm; draw food, plants, animals)
Level 4. Identify the community's needs and sources of supply.
Level 5. Identify the rules and laws that determine the uses of resources in the community. (related to government)
Level 6. Analyze the home and community environment and identify the social action underlying modification of the environment to utilize resources.

SUGGESTED PERFORMANCE OBJECTIVES FOR CONCEPTUAL PATHWAY C

Level 1. Prefer environments that are sanative in nature. (discuss TV program or movie that was an expression of beauty; decorate classroom with pictures; listen to stories, poems, and music about the environment.
Level 2. Select objects that are symbolic of beauty.
Level 3. Express ekistics through the crafts.
Level 4. Identify cultural components and forms. (identify cultural components of different cultures)
Level 5. Create an object or event that is symbolic of beauty. (collect pictures showing good and bad aspects of environment, state criteria of beauty)
Level 6. Act to conserve the environment.

The term level is not interchangeable with grade. Level indicates a level of maturity, experience, and understanding. These levels may best fit elementary school, but may be used with older children as well.

CONCEPTUAL FRAMEWORK FOR JUNIOR HIGH SCHOOL

Scheme I - - Societies perceive environmental issues of their time on the basis of past experience.
(probe concepts and values held by earlier societies)
Scheme II - - The interaction of the culture with available technology determines the nature of the environment, which is planned and developed.
(assess aims of students' culture in relation to own environment)
What kind of environment sustained ancient man? What happens when a culture with an advanced technology meets a primitive culture?
Scheme III - - Social issues and decisions alter the environment (emphasis on group).
(probe social issues that have altered the environment)
Scheme IV - - Social issues and decisions determine the utilization of all resources (emphasis on political decisions involving government and legislative action)
(probe into political decisions as they affect the utilization of renewable, nonrenewable, and nonexhaustible resources)
What are the values that are considered in making a purchase?

CONCEPTUAL FRAMEWORK FOR HIGH SCHOOL

Scheme I - In any given environment, organisms are linked within an ecosystem.

Scheme II - Issues and decisions affecting the world ecosystem reflect the pressure of population upon resources.

Scheme III - Wise utilization of the environment is dependent on the organization of shortage.
(explore limits of earth's environment to furnish the resources for modern and future life and living)

Scheme IV - The concepts and values man accepts as guides to his future behavior determine the quality of his life, if not his survival.

ENERGY AND ENVIRONMENTAL RESOURCE MANAGEMENT OBJECTIVES & ACTIVITIES

		K-3	4-6	7-9	10-12
CONCEPT A	1. To understand how groups of people historically have managed scarce natural resources for their collective benefit.	The teacher gathers and brings to class natural materials used by California Native Americans.	Students participate in a decision-making simulation game taking place on a wagon train.	Students are presented with situation cards describing a lifestyle from the past and present expectations for the future.	Students describe their attitudes toward natural resources from the viewpoint of persons in the distant past.
	2. To be aware of the key factors in the world today that have contributed to the decreased availability and quality of all natural resources.	Students simulate the effects of population growth.	Students monitor TV commercials and discuss how consumption patterns have changed over time.	Students study maps of an imagined wetland island. They note changes over time, and make recommendations for the development of the island along more environmentally sound lines.	Students research the changes which have occurred in local commute patterns since World War II.
CONCEPT B	1. To be aware of the importance of nonrenewable resources for maintaining our lifestyles.	Students monitor their classroom water use and take action to reduce water use.	Students conduct an energy audit of their classroom and discuss energy waste.	Students take a look at the air pollution problems of Los Angeles and determine ways in which Angelenos might improve the situation.	Students learn to read electric and gas meters. They do an energy audit of their homes.
	2. To be aware of economic, legislative, social, and other means that can be used in promoting the conservation of resources.		Students conduct a survey to assess attitudes and incentives related to recycling.	Students examine the bill which made the 55 miles per hour speed limit the law, its hows and whys.	Students state their opinions on the many "ways" to save a tree and rank them on effectiveness and desirability.
	3. To become aware of the potential for recycling and reclaiming resources.	Students make paper from used paper, cardboard and other materials.	Students choose a household container and research how it was made and what happens when it is "thrown away."	Students put together a picnic lunch with the minimum amount of unrecyclable materials, a "garbage free" lunch.	Students take a fact-finding trip to a local recycling center and interview the persons involved in the recycling effort.
CONCEPT C	1. To be aware of the role of technology in renewing and recycling resources.	Students take a short field trip to a Christmas tree farm or sales lot. Students make decisions about Christmas trees.	Students visit a lumberyard and interview a lumberyard worker.	Students make musical instruments out of forest materials.	Students learn how agriculture alters the biosphere and how much land surface has been altered by human activity.
	2. To understand that through technology, we expand the range of resources which we use in meeting our needs and desires.	Students examine their shoes, consider how shoes are made, and identify the variety of materials used.	Students take a survey of things at school, how these things got there and the fuel used for moving these.	Students learn rudiments of road map reading and discuss transportation in California, past and present.	Students design environmental, energy and resource management games requiring technological solutions.
	3. To be aware of the complexity that often exists in resource management, especially when intergovernmental and intercorporational cooperation is required.	Students plan and manage a classroom garden.	Students are each given control over one major resource. They negotiate with other students to get needed resources.	Students research episodes of California history concerned with resource management, such as The Great San Francisco Egg War.	Students discuss a hypothetical situation showing the trade-offs necessary to, and common in, resource management.
	4. To understand the necessity of long-range planning for resource management in relation to the assessment of future needs.		Students compare their "lifespans" to the "lifespans" of selected resources.	Students design a community emphasizing the relationship between the work place and the residence.	Students organize an expedition walking trip of 200 hundred miles (320 km) or more, using a systems approach to planning and problem solving.

This and the next three pages are from the Environmental Education Guide, Office of the Alameda County Superintendent of Schools, 1981. The objectives are useful in planning lessons with an environmental orientation.

BUILT ENVIRONMENT OBJECTIVES & ACTIVITIES

		K-3	4-6	7-9	10-12
CONCEPT A	1. To understand that built environments require continuous supplies of energy and resources from the natural environment.	Students examine natural structures and build some of their own.	Students analyze a collection of items to discover what resources were used to manufacture them.	Students design and keep an energy log for one day.	In a game, students identify the materials and energy consuming processes which went into the building of the school plant.
	2. To understand how humans manipulate and cultivate the natural environment to ensure consistent and continuous supplies of resources for built environments.	Students express appreciation for natural resources contributing to their lives.	Students look "beyond" the supermarket shelves at the relationship between the land and food.	Students interview older persons to learn of the sources of resources in the past.	Students design a park for their community.
	3. To understand how technology expands the geographic area from which built environments draw on resources from the natural environment.	Small groups create a mural or mobile showing the origin of the component parts of common items.	Students find out everything they can about chalk: its origin, uses, manufacture, history, etymology.	Students read two river poems and write some of their own. The river is fragile, a metaphor for our own flow.	Students exchange "environmental materials" with another class in a different region.
CONCEPT B	1. To understand how geographic location, available space, and people's needs for services, human contacts, and aesthetic stimulation interact in determining the design of a built environment.	Students experience different "population densities" in the classroom and discuss the effects of each situation.	Students design a small town in which they would like to live, and then must resolve the problem of increasing population.	Students shop for "wants" in stores of their own design.	Through word manipulation and other arts media, students share perceptions of societies' successes and/or failures in meeting personal needs.
	2. To understand how technological development and industrial expansion have contributed to the development of the modern day megalopolises in all parts of the world.	Students draw a picture of a dwelling used in a primitive society and a dwelling from the neighborhood. They list the differences in the dwellings.	Students inventory all of the materials and energy sources needed to play baseball.	Students draw lines between environmental concepts to show interconnections.	Class takes a field trip to a local secondhand store and compares goods of different vintages.
	3. To understand how individual and societal values and ethics influence the design of different types of built environments.	Students discuss and try out ways of physically arranging the classroom.	Students inventory and evaluate the energy-using aids and appliances in their homes.	Eating pretzels as fuel, students investigate transportation alternatives through a game.	Students run an extended role-play based on a Federal Court hearing on land use.
CONCEPT C	1. To understand that continuing supplies of energy are essential for the maintenance of life in both natural and built environments.	Students do physical exercises, observe and build simple machines, and discuss energy needs for various tasks and occupations.	Students perform an experiment with yeast to show that biological functions require energy and that the system loses heat.	Students assess all of the energy that goes into a garden. Several types of gardens are detailed.	Students analyze an oil company's "energy time line" which makes predictions for the future.
	2. To understand how both built and natural environments are dependent on the continuous renewal of resources.	Students examine changes in water, air, and the sun's movement on the school grounds.	Students draw pictures of their dwellings if environmental factors (space, climate, etc.) were changed.	Students assess the artist's values through analysis of landscape painting.	Students outline the environmental implications of the freedom to live wherever they desire.
	3. To understand that built and natural environments are continuously interactive and changes in one area of the environment can cause changes in many other areas.	Students list all of the things a plant needs for survival and then extend these factors to their own cases.	Students examine the differences which exist on different sides of a building with respect to the plant life and other environmental factors.	Students examine human uses of snow in various regions.	Students generate a list of possible environmental happenings and then list the consequences of those.

NATURAL ENVIRONMENT OBJECTIVES & ACTIVITIES

		K-3	4-6	7-9	10-12
CONCEPT A	1. To understand that all living things play roles and have fuctions in relation to maintaining and renewing the natural environment.	Students take a mini-safari to find out what lives in and around a variety of microhabitats.	Students build a model food pyramid with their bodies.	Students take a census of an outdoor site "job descriptions" for the organisms observed.	Through guided imagery, art, and language arts, students assess the results of the removal of one element from an ecosystem.
	2. To understand the web that binds together the biological community and the physical world within and between ecosystems in different natural settings.	Class sets up a mini-ecosystem in an aquarium.	Students sit in a circle and pass a ball of yarn to form a "web of life."	Students calculate the amount of H_2O released from a leaf through transpiration.	Student committees present mixed media shows illustrating the ecosystem of a nearby area.
	3. To understand how biological communities of plants, animals, and microorganisms interact within different environments.	Students compost their food waste.	Students' lunches are recycled in the classroom by common decomposers.	The decomposing role of sowbugs in the forest ecosystem is studied.	Students collect and arrange specimens in a terrarium.
CONCEPT B	1. To understand that different species of plants and animals depend on specific types of habitats for survival.	Students experiment to determine how plants will grow when subjected to different "types" of water.	Students play a cooperation game modeling systems interaction.	Students take a census of two adjacent natural communities and the ecotone between them.	Students make a mural of the water cycle. They interject disruptions in the environment.
	2. To understand that each system - water, land, air - contains resources that are important for the maintenance of life.	Students hang Vaseline coated paper to collect particles in the air.	Students model a resource balanced ecosystem in a game format.	Students do a worksheet activity on the marine food chain.	Students express opinions on ocean resource issues through debate, language arts, and/or graphics.
CONCEPT C	1. To understand how the energy radiated by the sun is utilized on earth to maintain ecological processes.	Students sprout beans in a sunny area and a dark area to compare beans from each area.	A series of experiments are conducted on the use of sunlight by plants.	Students test uncovered and foil covered coleus leaves for starch production.	Students trace a favorite food back to its ultimate source and trace the use of energy in supplying the food.
	2. To understand that energy can be stored by plants and converted through natural processes into large scale energy sources such as petroleum, natural gas, and coal.	Students are introduced to plants (foods) that give them energy.	Students simulate natural oil deposits by starting a compost pile.	Students prepare and perform a role-play activity on energy transfer.	Teacher leads the class in an extended role-play, modeling the process of fossil fuel generation.
	3. To understand that energy can neither be created nor destroyed—it is in a constant state of flux.	Students participate in a cooking activity to investigate physical and chemical changes.	Students use thermometers to measure heat in classroom.	Students read several personal statements on energy as a stimulus to expanding their own perspectives and writing their own poems.	Students examine the role the sun has played in the culture, past and present.
CONCEPT D	1. To understand the factors which determine the variety and abundance of life that can be supported within a geographic area.	Students investigate different sites in an outdoor area for heat, wind, moisture, etc.	Students experience directly the dramatic results of disruptions in an ecosystem.	Students find the locations outdoors, which are warmest, coolest, brightest, etc. (see level 1).	Through experiments and observation games, students make judgments on probability and desirability of trees in the environment.
	2. To understand how the biological community of plants, animals, and microorganisms adapt to the environment through changes in genetic composition and population size.	The group hunts for colored "worms" in two habitats and compares results.	Students role-play deer in a forest by looking for food, water, and shelter. A rock/paper/scissors game.	Students design animals or plants and explain the reasons for the organisms survival or extinction.	Students research local endangered species, analyze the problem, and prepare action statements.
	3. To understand how humans manipulate the environment and cause changes in the balance of conditions.	Students take a walk to examine the micro-habitats on and near walls.	Students simulate chemicals causing environmental changes and try to control their use and abuse.	Students set up indicators for CO and O^3 in several outside locations.	Students rate environmentally sensitive practices on a values continuum.
	4. To understand the natural forces that continually shape the environment.	A model stream table is set up. Students manipulate water flow and land forms.	Students write stories about, and act out, the natural forces which shape our environment.	Students construct a model of geological evolution — before and after demonstration.	Students assess the possible causes of global glaciation and write a disaster film script.

SOCIAL INSTITUTIONS AND DECISION MAKING OBJECTIVES & ACTIVITIES

		K-3	4-6	7-9	10-12
CONCEPT A	1. To understand how technological advancement and industrial expansion throughout the world are creating massive environmental changes that have worldwide effects.	Students interview elderly people from the community.	Through demonstrations and discussions of air and water movement, students discover how pollution can travel from one place to another.	Students use math and map study to outline the impact of land development on wildlife populations.	Students brainstorm positive and negative effects of off-road vehicles (ORVs). Students create lists for the more responsible use of ORVs.
	2. To understand that population growth in all parts of the world is creating an unprecedented demand for the consumption of natural resources.	Students count the number of people in the last two generations of their families. They discuss populations and the need to share resources.	Students simulate how rich and poor countries try to provide for the basic needs of their citizens.	Students participate in a global meal where 1/3 of the group eats an American meal, and 2/3 eat a Third World meal.	In a simulation game, Malthusian principles are demonstrated.
	3. To understand how national self-interests, and societal values and ethics influence international collaboration on environmental issues.	Through artwork and discussion, students describe and examine attributes of groups.	Students compare the belief systems and resultant behaviors of a Native American group and early settlers.	Students consider several hypothetical public policy decisions on food production from disparate points of view.	In a simulation game, students act as a committee gathered from different nations to erect an environmental monument.
CONCEPT B	1. To understand that technology for recycling and renewing resources, developing new resources, and discovering alternative uses for existing resources is critical for maintaining and improving our health, welfare, and economic prosperity.	Students learn additional verses to the song "It's a Small World."	Students look at long- and short-term effects of choices they make in purchases. Alternative lists are brainstormed.	Students consider packaging and its effect on the environment. They take a poorly designed package and redesign it.	Students design a segment of one community and take into account economic, energy, environmental, and aesthetic considerations.
	2. To understand how the short-term and long-term effects of resource use can influence related economic decisions.	Students sort and examine classroom waste and recycle selected items.	Students devise other uses for common items in a format game.	Students discuss a fictional work related to the use and abuse of natural resources.	Students examine the pros and cons of packaging in the fast food industry and make recommendations.
CONCEPT C	1. To understand how interest groups express the values, ethics, and understandings of subgroups within our society.	Students sort themselves according to physical attributes and opinions.	Students make a list of appropriate behaviors in outdoor settings. They look at them from the viewpoint of various interest groups.	Students role-play a city council meeting in which they must choose to fund only one of three environmental projects.	Students design logos representing interest groups concerned with environmental issues.
	2. To understand that interest groups are established to participate in the political process and to influence public policy and lawmaking.	Students learn about and make models of endangered animals.	Students create a story from facts only with interest groups viewpoints attached.	Students design a coat of arms representing a citizen's group, governmental agency, etc., concerned with the environment.	Students read position papers put forth by groups on the issue of overpopulation of deer in a small California park.
CONCEPT D	1. To understand that communications media through reporting, advertising, and other programming can widely influence public attitudes about the environment.	Students play describing games to see how well they can communicate a simple message. TV ads are analyzed.	Students role-play different propaganda techniques and examine advertisements for bias.	Students collect energy ads, discuss their purpose and effectiveness, and then design an energy conservation billboard.	Students detail some of the techniques used in the media to influence thought and opinion.
	2. To be aware that a variety of public and private organizations provide educational programs to influence public opinion about the environment.		Students write an editorial on land use in a hypothetical locality.	Students analyze environmental education curriculum materials for bias and manipulation.	Students write for their own class, lesson plans reflecting the biases of selected interest groups.
	3. To be aware of the various avenues which are available for individual expression of concerns about the environment.	Students express their feelings about a forest environment through creative dramatics.	Students examine ways of expressing their environmental concerns and then actually "make a statement."	Students choose an issue and write a petition to bring about change.	Students use a model letter form and write to those who have power over an environmental issue.
CONCEPT E	1. To understand that governmental agencies at state and national levels monitor the environment, make recommendations for laws, and monitor the implementation of the laws.	Students examine a classroom problem and the effectiveness of rules.	Students inspect a map showing the land area designated as public parks and open spaces and identify the origins of these designated areas.	Students conduct a mock trial involving thermal pollution of a stream from a nuclear power plant.	Students hold small group meetings to prepare statements on the use of national forest lands for vacation homes.
	2. To understand that environmental laws reflect a great many factors, such as economic consequences to an industry, technological development, and short- and long-term consequences for the environment.		Students take part in a land use planning decision concerning a newly formed lake.	Students simulate an EPA hearing on the use of DDT on the spruce budworm.	Students collect information in a school survey to determine how their school functions, what the power structure is, and who makes the rules.
	3. To understand that the effectiveness of environmental law is dependent on the extent to which individuals and groups accept responsibility for the care of the environment.		Students attempt to equitably divide coastal waters out to a 200 mile (320 km) limit.	Students predict what would happen to a vacant piece of land in the community which was owned in common.	Students analyze the actions of individuals in the environment and make value judgments.

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Photo by Leigh Hawkinson

Rainwater

Rushing from dark canyons
it purges its path, pausing
only to peek into corners
and under stones.

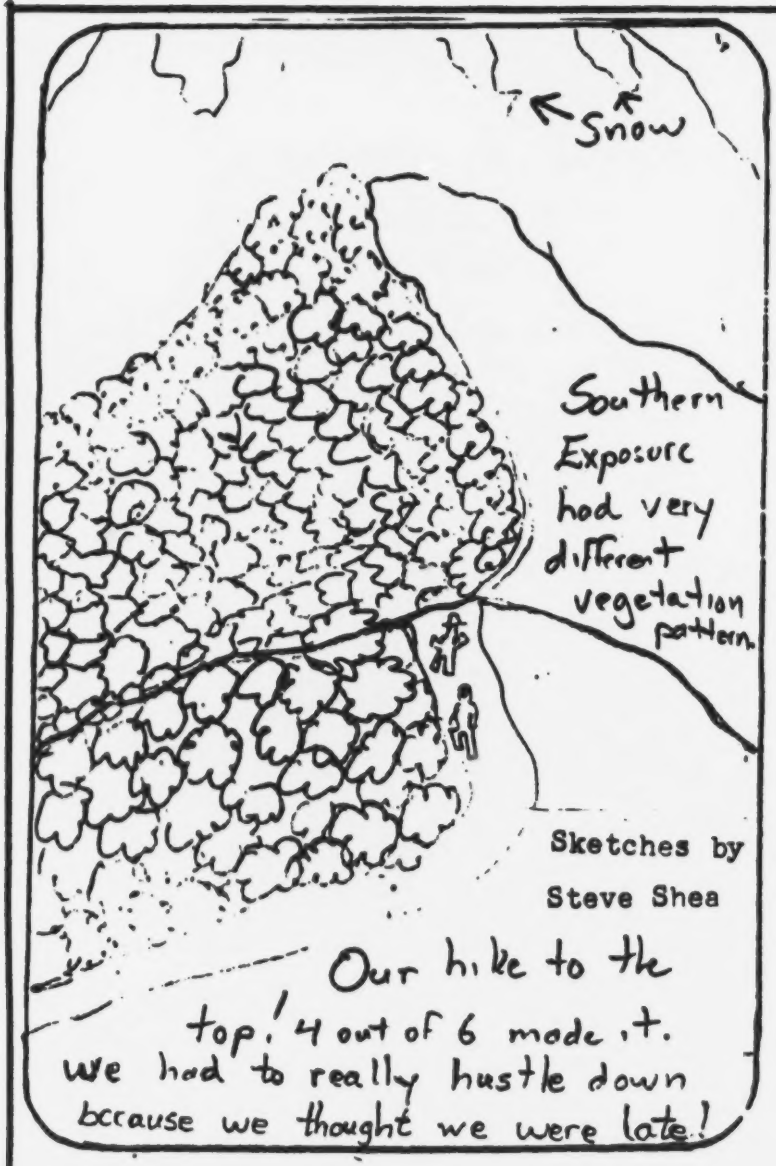
The deafening thunder belies
its gentler side, as it drips
delicately off leaf-ends and
plops into pools.

It oozes and soaks the sod
to depths far below,
ever-questing distant roots
and fossil stones.

Innocent sprinklings of glassy
beads, poised precariously on
fragile twigs, at the mercy
of betraying breezes.

Placid ponds unbothered by
currents, devoid even of wind ripples;
burdened with the weight
of lifeless reflections.

- Marcia LoGiudice


Snow
Southern Exposure had very different vegetation pattern.
Sketches by Steve Shea
Our hike to the top! 4 out of 6 made it. We had to really hustle down because we thought we were late!

My Environmental Experience

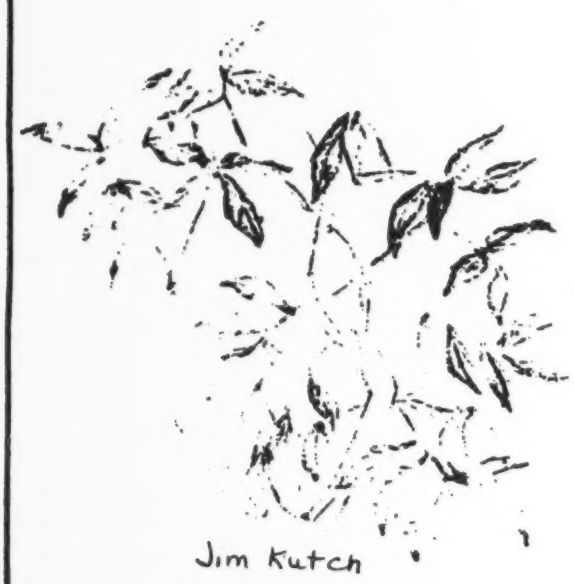
When Dr. Stoner mentioned that we were going to an out-door school, I was a little leery because I am not an outdoors person. When the day finally arrived I was still unsure how I was going to like all this. After going 5 miles out of my way I finally arrived at my destination. Everyone was waiting around and they seemed as anxious as I. After instructions from Dr. Stoner we were on our way. I was out of breath after the first few minutes. Could I make it to the top of the hill (or was it a mountain?)At this point I wasn't sure. To make things exciting, we had to cross a bridge (that didn't seem too stable); it could only hold six people at a time. What does that tell you? Anyway, I felt as if I was in an Indiana Jones' movie. We then began to get in touch with nature. I was able to use all my senses once my heart stopped beating so fast. To make a

(cont. inside)

This stream is free and clear,
I see.
Freely running here,
I see.
Running as a child,
Without stopping to ponder,
" How shall I survive? "
Their future is ours to guide,
Do you see?
A stream and a child running free,
The world must see!

When I first saw the stream at Loch Leven, I thought of my daughter, Kelli. She would love to put her feet in the water and look at all the different rocks. It was at this moment I realized nature and children are not that different. They are both our responsibility and depend on us for survival.

Kelli's Mom



Jim Kutch

long story short, I made it to the top of the hill. We were able to see the view all around us. & Dr. Stoner pointed out the different communities all along the way. We went through the Woodland ecosystem, the Chaparral and the Riparian. We saw poison oak, manzanita, and stinging nettles (just a few of the plants & trees we saw). I was beginning to relax. I enjoyed walking thru the woods & experiencing nature.

The campfire that night was great, also the lecture, &, of course, the singing & the "drama." I would like to return with students from an elementary school. It would be wonderful to see their reactions and hear their comments.

Thanks, Dr. Stoner. I really enjoyed the experience.

by Mary Owens

Haiku

On the world's rooftop
I survey God's handiwork -
Green mountains; blue skies.

Cascading droplets
Wash away the cloying world;
Shower of new life.

Pray, find the songbird.
The one with the sweetest voice
Knows your song by heart.

Share these few moments -
Touching hearts and merging souls,
Breathing mingled air.

- Marcia LoGiudice

Continuum

**If aldera are young, how old are we?
Following the sameness of water
to rock, wanting to step in and
slow the passage of years of travel.
Step in where others have left
so quickly no prints remain.**

**How far from the straining
aldera we can walk and
still hear the water's song -
years beyond, the music clings,
where we have lost our hold.**

Leslie Nardo-Dallas

LESSON PLANS

The following lesson plans were selected from those developed and taught by the pre-service teachers during the winter and spring quarters.

Formats vary due to criteria established by master teachers or school districts.

Several of these actual lessons are available for viewing on a videotape. Contact Darleen Stoner at California State University, San Bernardino concerning the videotaped lessons.

Lesson Plan: **Hilda Taba Lesson on Values and the Environment**
Teacher: Teri Chelbana
Class: 1st Grade

WHAT: Disposal of waste products is affecting the natural environment.

OBJECTIVES: Students will demonstrate through discussion that they perceive that people may have different values.

MOTIVATION: Class discussion about values and the environment.

MATERIALS: None. The teacher will present the following situation.(Listening)

On Saturday I stopped in at the little market down on the corner, I think it's a Circle K, to buy a coke. When I went back outside to get into my car I saw three kids, about the same age as you, six or seven. They were just leaving the store after buying some candy. And do you know what I saw them do? They threw their candy wrappers down onto the ground. I looked around and saw all kinds of trash laying around. There were candy wrappers, paper cups, and other paper littering the ground.

PROCEDURE: After presenting the situation, the teacher will ask the following questions.

Teacher: What did these children do to make their neighborhood look bad? (Inferring)

Student: They threw their trash on the ground.

Teacher: Why do you think people do that? (Inferring)

Student: Because they don't care if there's trash laying around.

Student: Because there wasn't a trash can there.

Student: Because their friends do it.

Teacher: What does this indicate about what they think is important? (Inferring)

Student: They don't think their environment is important.

Student: They don't care what their neighborhood looks like.

Teacher: If you were confronted with a similar situation, what would you do and why? (Hypothesizing)

Student: I would put my trash in the trash can because that's what my mom told me to do.

Student: I would put my trash in my pocket until I got home because I don't like to put trash on the ground.

Student: I would tell the other kids to pick their trash up offthe ground because it makes the neighborhood look bad.

Teacher: What does this indicate about what you think is really important? (Inferring)

Student: I want my neighborhood to look nice.

Student: I don't like trash laying around in my neighborhood.

Teacher: What differences do you see in what you and other people value? (Inferring)

Student: Those kids don't care about their neighborhood, but I do.

Student: Some people don't care if they litter the neighborhood, but other people do.

Student: Different things are important to different people.

EVALUATION: Listening to students' oral discussion about values.

ASSIGNMENT: Students will look around their neighborhood and see if they notice people doing something they wouldn't do. Have them report it to the class, and discuss it.

LESSON PLAN: **Why Trees Are Needed**
TEACHER: Pam Fordahl
CLASS: 1st Grade

WHAT: Humans must conserve and protect their natural resources.

OBJECTIVE: In a group discussion, children will name at least ten uses for trees.

MATERIALS: Teacher - large drawing of bare tree, green magic marker; display of things from trees; painting of tree, paper, wooden ruler, pencil, fruit, etc.; The Lorax by Dr. Seuss.

Students - construction paper or poster board, old magazines, scissors, paste.

PROCEDURE: The teacher points to the drawing. "What is this?" "What else is a tree to us?" (Questions may have to be more leading for younger children). As the students respond, the teacher draws branches on the tree and writes each answer on a separate branch. (A limb may be labeled "wood" and the branches would be furniture, houses, etc.)

The teacher shows the items in the display. "Could someone summarize what we have discussed here?"

The teacher shows the last item from the display, The Lorax. "What do you think this book is about?" After reading: "In the book the Once-ler was the enemy of the trees, why?" "In real life who do you think is a tree's biggest enemy?" "What do we do to hurt trees?" "What are some steps we can take to insure that plenty of trees are here for our lifetimes and for future generations?" The teacher lists these answers on the board.

EVALUATION: In a group discussion, students are able to name at least 10 things we need trees for.

ASSIGNMENT: Students will recycle old magazines into art work. They will cut out pictures of things we use trees for and make a collage titled "The Giving Tree."

Lesson Plan: **Using Literature to Teach Four Basic Needs.**
Teacher: Jill Stevens
Class: 2nd grade

WHAT: This is a lesson about the four basic needs of people and other animals: homes, food, clothing, and air. The students will see that people and other animals need to share these four things in order for all of us to survive. Students will realize that often people take away from the other animals. After reading the story What Do You Do With A Kangaroo?, the student will reach their own conclusions about whether this is right or not.

OBJECTIVES: Through a discussion lead by the teacher and a story read by the teacher, students will come to the conclusion that people and other animals need the same four basic things: homes, food, clothing, and air. Of these four basic needs, the students will come to the conclusion, through oral discussion, that people and other animals need to share these four basic things if we are all going to survive.

MATERIALS: Chalk, chalkboard, What Do You Do With A Kangaroo? (Mercer Mayer, New York: Four Winds Press, 1973)

MOTIVATION: The students will be motivated in this lesson because they will be able to participate in a discussion on the four basic needs and how we can do something to ensure that everyone will have these four basic needs met. The students will also have a book read to them by the teacher and they will have a chance to decide if they would behave like the character in the book or not. The students will also get a chance to write about why they agree or disagree with the character which gives the students a chance to tell something about themselves.

PROCEDURES: There are four things that every person and animal on this earth needs to live. What do you think they are? (The teacher writes the answer on the board.) The teacher narrows down the four correct answers by stating how the other suggestions that students have given are not necessary to live. When we need something to live, we call that a basic need. (Write basic need on the board.) When we have all of these together homes+clothing+food+air (write this on the board) Does anyone know what we call that? (At this point the teacher lets students make guesses until they have none left. The teacher may or may not list the guesses on the board) We call it a habitat. (Write "habitat" on the board.) And when one of these four basic needs is missing, then it is not a habitat anymore. Each person and animal have their own personal habitat and even though we have the same basic needs, every habitat is special to the person who owns it.

What happens when someone interferes with part of the habitat?
How could someone interfere with a habitat? What happens when there is a forest fire?
What kinds of animals make their homes in the forest?
How does a forest fire usually start?
What happens when there is an oil spill in the ocean?
What kinds of animals live in the ocean?
How does an oil spill happen?
What happens when people want to have mink coats or fox fur coats? (In this answer, I am looking for the fact that people take animal's clothes to make clothes for themselves.)
What happens when we go to the woods for a picnic and pick all of the blackberries or blueberries to make ourselves a pie?
Who else eats berries?
What happens when the bears and birds do not have any berries left to eat because we have taken all of them?
What happens when people drive their cars too much?
What does that smog do? (Makes our lungs black and unhealthy)
What can we do instead of driving our cars all of the time? (Ride bikes, walk, take the bus, carpool)
Does it seem like people are very good at sharing the four basic needs with the animals? But we all need the same four basic things to live and to have our special habitats.
Do we ever ask the animals if we can go camping in the woods?
What part of the animals' habitat are we interfering with?
Do we ever ask the animals if we may have all of the berries to make pies for ourselves?
What part of their habitat are we disrupting?
Do we ever ask the animals if they mind if we drive our cars all over and make so much smog that the air is unhealthy to breathe?

I am going to read the story now called <u>What Do You Do With A Kangaroo</u>? where animals act just like people do sometimes. Pay close attention to what the little girl does in this story because afterwards we will talk about it and then write a story about how we would have acted. The teacher would then proceed to read the story asking questions along the way to get the students' reactions to the little girl and the animals in the story. After the teacher has finished reading the book, there will be a discussion about how the students felt about the little girl in the book.

<u>EVALUATION</u>: The students' participation in the class discussion and the subsequent writing of the story would act as my evaluation for this lesson.

<u>ASSIGNMENT</u>: I would like all of you to go back to your desks and finish the sentence, "If I was the little girl I would..." Please tell me in your story if you would let the animals stay and why you would or would not. After we have finished the stories, we will put them on the bulletin board.

LESSON PLAN: **Teaching Environmental Concepts Through Sign Language**
TEACHER: Leslie Nardo-Dallas
CLASS: Third-fourth Grade

EKISTICS CONCEPT: "Man utilizes his/her symbolic and oral traditions to interpret the environment."

SCIENCE ADDENDUM CONCEPTS: "Animals live in a variety of environments..." "Animals have characteristics by which they can be described and identified."

OBJECTIVE: Through demonstration of sign language symbols, students will identify the sign for at least one animal discussed in class, and correctly describe its habitat by completing the short story assignment.

MATERIALS: Paper, pencils, sign symbol pictures, animal/habitat poster.

MOTIVATION: Children observe and participate in demonstration of sign language symbols for various wild animals and habitats.

PROCEDURE:

1. Remind students of our last science lesson, concerning wild and domesticated animals. Explain that today we'll learn another way to describe animals.
2. Ask, "Who knows what sign language is? Have you seen anyone using sign language? Why do we use sign language?"
3. Show the sign for butterfly and ask if anyone can guess what it is.
4. Do the same for the owl, bear, fish and turtle. Ask them all to sign with me and I'll check their hands.
5. Put pictures of these animals up on the board and sign each animal, asking the kids to come up and choose which ones I've signed.
6. After working on the animal signs, ask then where a butterfly lives. (Responses: tree, air, sky.)
7. Show the sign for sky. Do the same for each animal and point out these live mainly in either water, sky, or land.
8. On the board write the correct name of the animal under the word that represents its habitat.
9. Finally, check for comprehension by having them correctly sign at least one of the animals.
10. Recommend reading the book, "Words In Our Hands", which is about a boy whose parents are deaf.

EVALUATION: Students will be asked to write a short story using one of the animals and its correct habitat. They must choose an animal they can sign.

ASSIGNMENT: As a follow-up assignment, students will be asked to use "Words In Our Hands" or the other sign book to learn to fingerspell their names.

LESSON PLAN: **Deciding on Basic Needs**
TEACHER: Terri Ustation
CLASS: 5th Grade

EKISTICS CONCEPT: Men and women utilize the environment to secure their needs.

OBJECTIVES:

1. Given these eight possible human needs: food, shelter, clothes, pets, entertainment, transportation, companionship, and sleep, students will accurately discuss these needs in relation to the environment and rate them in order of importance according to human survival.

2. Students will orally identify the four most important and basic human needs as food, sleep, clothes, and shelter.

MATERIALS: Chalk board with lines dividing it into eight sections, each section is numbered 1 - 8; tape, eight cards with one for the following words on them: shelter, clothes, food (includes water), pets, entertainment, transportation, companionship, and sleep. Each card should have pictures or photographs on them illustrating the word on the card.

MOTIVATION: Students will be motivated by:

1. Holding colorful cards and discussing what they mean in terms of human survival.

2. Hearing a story about a boy who gets lost and solving a problem concerning the story.

3. Taping the cards on the board.

PROCEDURES:

1. Read this passage to the class:

   Adam is lost. Somehow he became separated from his friends while they were hiking in the mountains. He's not scared, though. He knows that there are certain things a person needs in order to survive. His friends have all the supplies. He might have to survive in the wild for some time until he is rescued. What survival needs should be taken care of first? How can he use the mountain environment to meet these needs?

2. Explain that the class is going to discuss in what order Adam should take care of his survival needs. These needs are on the eight cards. Pass the cards out to eight people. Point out that there are no right or wrong answers. As a survival need is discussed, the person holding that particular card should stand up. When the class has decided on the first thing that Adam needs, the person holding that card will tape his/her card on the board in the section that says #1, and so on, until all eight cards are taped on the board, During this discussion, the teacher will ask students why they chose a certain need as important to Adam.

3. Can Adam use the mountain environment to obtain any of these needs? How? What are the first four needs that we decided are the most important for Adam to survive? Do they apply to anyone? Would these four needs stay the same in other environments? Why?

4. Ask one or more students to summarize our discussion.

EVALUATION:

1. Observe the class to make sure everyone is orally participating in the discussion.
2. Check the interview assignment to see if points that were discussed in class are incorporated in their report.

ASSIGNMENT: Interview a family member. Show them a list of the eight possible survival needs that we discussed in class and ask them to rate the needs from most important to least important. Ask them why they made their choices and how they could use the environment to meet these needs. Compare their list to ours. We will listen to some of the reports in class.

LESSON PLAN: **Simulation - "The Issue of Windy Point"**
TEACHER: Kevin Cullen
CLASS: 5th Grade

OBJECTIVE: The students will participate in or observe a simulation, discuss the issue presented, and write a short paper that expresses their opinion of what should be done with Windy Point, a preferred spot for off-road vehicle enthusiasts.

MATERIALS: Readers' theatre script based on current event.

PROCEDURE: After reviewing terms and vocabulary, the teacher will introduce the narrator and the play will begin. After the play the teacher will ask the class the following questions and expect the following responses.

Teacher: How does the BLM official feel about the area?

Student: She is concerned about more people being hurt.

Teacher: How do the Palm Springs administrators feel?

Student: They're concerned because they told people the area would stay open.

Teacher: How does the city manager of Palm Springs feel?

Student: He's concerned about the cost to the city if they participate in the BLM plan to use patrol officers.

Teacher: How do the environmentalists feel?

Student: They worry that the off-roaders will go someplace else if the area is closed and then they will destory more of the desert habitat and wildlife.

Teacher: How do the off-roaders feel?

Student: They didn't want the area closed because they want a place to use their recreation vehicles.

Teacher: How do the county supervisors feel?

Student: They feel that the BLM's proposal is necessary because people are getting hurt and no one is there to help them.

Teacher: What experiences have you had that are similar?

Student: (Students will relate similar experiences, if any) There is a hill near our house and the Sheriff comes by sometimes and tells us that we can't ride our dirt bikes there because it's dangerous.

ASSIGNMENT: Students will write a short essay on what they feel should be done about Windy Point.

SCRIPT

THE ISSUE OF WINDY POINT

MODERATOR: "We will now begin the public hearing on whether or not to close Windy Point. Our first speaker this evening is Mr./Ms. _____ _____. Mr./Ms._____ is the area manager for the Federal Bureau of Land Management.

BLM: "Hello, everyone. For those of you unfamiliar with Windy Point, it's the area on the north edge of Palm Springs, along the San Gorgonio and Whitewater rivers and Highway 111. Each weekend, thousands of off-road vehicle enthusiasts are attracted to this area. There are no regulations for them to follow, no toilet facilities and no supervising authority. Primary among the BLM's concerns is the increase in personal injuries. During the past year and a half, Desert Hospital has treated over 150 Windy Point related injuries. There have been four fatalities and four serious injuries in addition to this. The BLM report recommends that the area be closed in order to prevent further accidents. To do this, it will be necessary to have officers patrol the area. That sums up the BLM position; however, we'll go along with whatever the city of Palm Springs and the county decide."

MODERATOR: "Thank you, _____. Our second speaker tonight is _____, who is the chairman for the county supervisors."

COUNTY: "Good evening all. It wasn't long ago that I used to eat my lunch under the Highway 111 bridge. It was a nice tranquil place. Not any more! We at the county are very concerned with the number of accidents occuring there and feel that either we should close the place down or try to make it a supervised park. That's our position on the matter in a nutshell."

MODERATOR: "Thanks, _____. Our next speaker, ladies and gentlemen, is _____, the city manager of Palm Springs.

CITY MANAGER: I'll try to be brief and to the point. The major question facing the city of Palm Springs is the cost of posting patrol officers. It's already costing the city money in the form of emergency services. Before the city can participate in any decision of the BLM's, we must determine costs to patrol the area.

MODERATOR: "Thank you, _____. I believe that our next speaker may be able to give us some information on what the costs may be to patrol the area. Here's Sheriff _____."

SHERIFF: "The cost to the Sheriff's Department to increase patrols wouldn't be anything that significant. It kind of depends on whether you want to limit the area or close it down completely."

MODERATOR: "Thanks, Sheriff. Captain _____ of the Palm Springs Police Department is our final speaker."

POLICE: "Good evening, folks. I don't know exactly how many patrol officers would be needed to do the job, but I can tell you that for a two-man police team, one weekend only, could cost about $600.00 a week."

MODERATOR: "Thank you Captain. We will now take time to hear some of the public's comments over this issue. Sir, would you step up to the microphone and introduce yourself."

RESIDENT 1: "My name is _____, and I've lived in Snow Creek for 16 years. I think that you should get those off-roaders out of the area. They have no respect for other people's property; they drive those three wheel, noisy things on people's yards and down public streets. They go wherever they please and it isn't right. Thanks for listening."

MODERATOR: "Thank you sir. Next please, introduce yourself."

ENVIRONMENTALIST: "I am Dr. _____ from the San Bernardino Audubon Society. While it disturbs the Audubon Society to see any part of the environment treated in such an irresponsible and frivolous manner, we feel that the lesser of two evils is to contain the abuse in one area in order to preserve other more sensitive areas.

Prior to the off-roaders use of Windy Pint, they were driving their vehicles on Edom Hill. This area is home to the Fringe-toed Lizard, which is on the endangered species list. If Windy Point is closed, all of these people may go to more sensitive, environmentally protected areas."

MODERATOR: "That certainly gives us something more to consider. Thank you Dr. _____. Would the next person step up to the mike, please?

OFF-ROADER #1: "My name is _____, and I ride a three-wheeler out at Windy Point. Now I know that there are some people that are inconsiderate out there, but most of us are good people that just want some place to go for a little fun. Windy Point is a good place to go."

MODERATOR: "Thank you, Mr./Ms. _____. Next, please.

RESIDENT #2: "Yes, I live out at Snow Creek. I would just like to say that I don't think it's fair for the people that live here to have to put up with these off-roaders on weekends."

MODERATOR: "Thanks for voicing your opinion. We have time for one last speaker."

OFF-ROADER #2: "My name is _____, and you should understand that you can't stop people from having fun. If you close Windy Point, we'll just go someplace else, and then nothing will be solved."

MODERATOR: "Thanks to everyone for contributing tonight. We certainly have a lot to think about. As most of you already know, we are expecting to receive the information from a state funded survey as to the feasibility of turning Windy Point into a supervised off-road vehicle park. This meeting will now come to a close."

LESSON PLAN: **Food Chains**
TEACHER: Scott Lambert
CLASS: 6th Grade

WHAT: This lesson will introduce the concept of food chains and the crucial importance of plants in all food chains.

OBJECTIVE: Working individually, students will devise at least two 3-step food chains.

MATERIALS: Blackboard, chalk.

MOTIVATION: Opportunity for open, unpressured discussion on a topic of which students already possess both interest and knowledge.

PRODCEDURE: I will begin by asking the students about food, i.e., do you like it? What kinds?, etc.. Then, I will ask them why they think food might be important. At that point, I will discuss the fact that food is indeed important for our survival and ask them what types of food they eat to survive. This will generate a list that I will put on the blackboard. Some of the foods mentioned will then serve to lead to an explanation of food chains. Eventually, this will lead us back to plants where we can then discuss the importance of plants for animals.

EVALUATION: At this stage I will introduce a carrot stick and ask the students to create several possible food chains that could begin with a piece of carrot, e.g. carrot-rabbit-man.

ASSIGNMENT: The students could derive food chains from their dinners for several days to find out what plants or animals their families rely on the most. We could make food chain posters, discuss junk food and/or chemicals that find their way into various plants and animals and the possible repercussions for human beings.

LESSON PLAN: **Pollution: Discussion and Action**
TEACHER: Sotera R. Madison
CLASS: 6th Grade

WHAT: Land use, pollution, energy use and application of technology all involve ethical considerations for individuals and society.

OBJECTIVES:

1. Students will discuss orally things that they personally can do to stop land and water pollution.

2. Students will identify and participate in the clearning-up of a polluted area in their community.

MATERIALS: Study prints.

PROCEDURE:

1. Show students three study prints.
   a. Water pollution.
   b. Garbage pollution.
   c. The ugly landscape.

   Ask Students:
   1. How do these pictures make you feel? Why?
   2. Why do you think these landscapes look the way they do?
   3. Who made them look this way?
   4. Do you think these landscapes can be changed? How?
   5. Why would we want to keep things like the pictures shown from happening?
   6. How could you help to stop land and water pollution?

VOCABULARY:

Land pollution
Water pollution

EVALUATION: Students' responses to discussion questions and follow-up action project.

LESSON PLAN: **Pollution Alert** (based on Hilda Taba format)
TEACHER: Marcia La Giudice
CLASS: 7th - 8th Grade English

OBJECTIVES:

1. Students will participate at least once by responding verbally to questions about air pollution.

2. Students will discuss their own values regarding air pollution and offer at least one possible solution.

GOALS: To encourage environmental awareness in students, help them to recognize their own values regarding the environment, and to assist them in organizing those values through a writing activity.

MATERIALS: Copy of "Pollution Alert"

PROCEDURE:

1. Read the situation "Pollution Alert - Take a deep breath!!"

   I quote, "In Riverside, CA, the air is so bad on many days that kids can't play outdoors, the sun is rarely seen, and they're beginning to grow oranges in oxygen tents." Roger Rapoport

   Mr. Rapoport investigated air pollution in Riverside and in addition to the above examples, he found motorists who complained that they needed their headlights during some days, residents who no longer jog because of the strain on their lungs, and the number of days with smog alerts outnumber those without.

   Riverside is not alone in this problem, most metropolitan areas are effected. In 1978, Washington, D.C. had an Air Quality Index reading of 130, a very hazardous level. People with heart problems are forced to remain indoors. When the smog is mixed with extreme heat, even normally healthy people can end up in hospitals. Senior citizens and young children are at the greatest risk and are usually cautioned to stay indoors and to avoid exertion.

   Meteorologists explain that topographical features are a major factor in why some areas have more pollution than others. In the Washington, D.C. area and in many parts of

Southern California, a stagnant air mass can hover over the cities for weeks at a time. On the other hand, cities such as Seattle, San Francisco, and Minneapolis have few alerts because the arctic wind currents sweep the skies clear.

The problem seems to be getting worse because of an increasing population and the lack of sufficient mass transit systems which would help eliminate the "number one smog producer - the automobile." Industry, too, continues to pour clouds of pollution into our skies.

Concerned citizens are attempting to find answers to the growing problem, but new ideas are needed if there is to be real progress made.

2. Ask follow-up questions and conduct discussion.

   a. What is the problem in this situation? (Summarizing)
      Predicted response: Our air is polluted.
   b. What are some of the factors contributing to air pollution? (Inferring)
      Predicted response: cars, industry, weather.
   c. Have you ever seen a situation similar to that in the picture? (Describing)
      Predicted response: All the time, especially in the summer. It's not really that bad, that's exaggerated.
   d. How does it make you feel? (Emoting, describing)
      Predicted response: Angry; frustrated; sad.
   e. What would you do if your health, or that of a loved one, was affected like these people? (Hypothesizing)
      Predicted response: I'd join a protest group. I'd move.
   f. What would be your reasons for this action? (Explaining)
      Predicted response: I feel like someone has to do something. I don't think one person can get anything done.
   g. What does this indicate about what you value? (Inferring)
      Predicted response: I'm a responsible person. I just don't like to get involved.

<u>If time permits</u>:

   h. What possible solutions are there for air pollution? (Hypothesizing)
      Predicted response: Invent big fans. Fine companies who pollute the air a lot. Prohibit cars.

i. How can you personally help alleviate smog? (Explaining)
Predicted response: Ride a bike. Car pool. Write a letter to my congressman.

EVALUATION: Active participation and the written assignment will both be indications of the lessons success.

NEXT ASSIGNMENT: A Riverside, California resident commented: "It's very depressing to live in a community surrounded by lovely mountains that you can't see."

Write a short essay either agreeing or disagreeing with this statement. Use ideas generated in today's discussion, in addition to your own experience.

LESSON PLAN: **Acting out Ecological Terms**
TEACHER: Tina M. Lardieri
CLASS: 8th Grade Drama

GOAL: Students will be able to interpret and identify ecological concepts.

OBJECTIVES: Upon locating definitions and performing pantomimes in class, the student will be able to identify orally the need for balance in the ecological system.

MATERIALS:
- Project Wild text
- Chalkboard and chalk
- Dictionary
- Index cards
- Large performing area

PROCEDURE:

1. Establish students background knowledge and concepts of ideas that will be discussed in class. Examples of good selections would be: carnivore, herbivore, extinction, predation, food chain, pollution, habitat, ecosystem.

   a. Words will be written on the board.
   b. Students will be asked if they know what each word means.
   c. Students will be asked how they feel about each word.

2. Students prepare for their performances.

   a. Divide class into groups.
   b. Hand out index cards with one word printed on each.
   c. Pass out dictionaries.
   d. Give students time to discuss and rehearse.

3. Students perform their literal and personal definitions of their words. These can be combined or done individually depending on the students interpretation of each word.

4. An in-class discussion and critique will be done following each performance. Possible questions include:

Do you see why this group chose those actions for their word?
How do you feel about these words now?
What is the importance of a balance in our ecological system?
What can we do to keep this balance in order?

LESSON PLAN: **Imaginary Creatures**
TEACHER: Gregg Hernandez
CLASS: Basic Art, Jr. High

TOPIC: Drawing an Imaginary Creature. Students will explain traits of their creatures necessary for survival in nature.

SOURCE OF DIAGNOSIS: Students need to become aware of importance of animals traits bestowed upon them by nature to survive. Students need to discover in nature animals are usually proportioned to fit their environment due to thousands of years of evolution.

OBJECTIVES: Each student will produce on a 12" by 18" manilla drawing paper at least one tempera painting of an imaginary creature or animal. Students may use the encyclopedia for reference of ideas.

Each creature painted by each student must have at least three visible traits needed for survival. Each creature cannot be recognized by the teacher as an animal already in existence. Students have one week to complete project.

Each student will verbally in class give reasons for choosing particular traits for their creature. This will be at the end of the one week assignment.

MATERIALS: Pencils, tempera paint, 12" by 18" manilla drawing paper (one per student), encyclopedia.

Lesson: **Conservation of Unpaved Land** (Using Taba's developing generalization strategy)

Teacher: Nancy Kluding

Class: Algebra 1 (suggested follow-up to "rate x time = distance" lessons) (Could also be used in social studies)

Concept: The values of society affect the utilization of its natural resources.

Objectives:

1. The students will discuss the relationship of road development to environmental conservation.

2. The students will become aware of the potential for reclaiming the natural resource of land by observing paved areas on their campus and reporting on which locations could have been left in their natural state.

3. Each student will conduct a personal survey of their school and submit written comments on their observations.

Materials: Atlas or U.S. map, handouts with charts concerning area covered by paved roads, population increases, and pictures of road maps and examples of roads.

Time	Teacher Activity	Student Activity
10 min.	Discuss history of roads in country	
	Q1 "What have you noticed about road construction with respect to population?"	("increased")
	Q2 "What happens to the natural environment when roads are built?" (inferring)	("gets ripped up/ decreases")
5 min	Handout "Conservation of Unpaved Land" and flow chart	Reading silently
15 min.	Q3 "What will happen to people if we don't limit road construction?"	
	Q4 "What does the math model tell you about people's attitude toward conserving the environment?"	("more interested in roads than actual need and/or conservation")
	Q5 "What is the significance of the information you've just read?" "How does one thing affect the next?" (Generalizing)	

Follow-up assignment: Conservation of Land

Walk around the high school campus and look at the amount of concrete on the school grounds. Is all of it necessary? Are there places on campus where you think the land could have been left unpaved? Be sure to consider the balance between hardship and excess. (Classrooms with dirt floors are not practical.)

Write about your observations. You can use any form you like. Your report can be a letter (to anyone), a journal (diary, science,...), a commentary or news story,....

CONSERVATION OF UNPAVED LAND

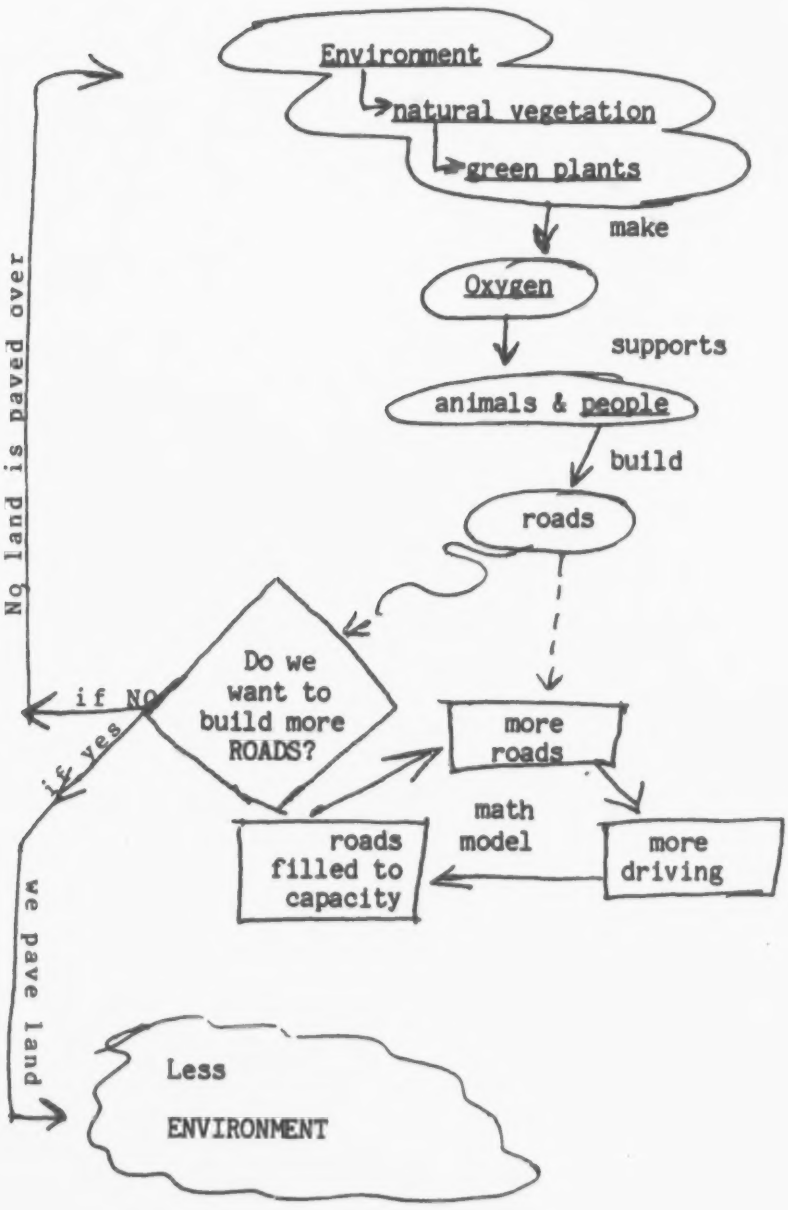
The action of light energy on green plants is called photosynthesis. One result of this exchange of energy is the production of oxygen from carbon dioxide. Plants use 150 billion tons of CO^2 and produce 400 billion tons of oxygen each year. 45% of the earths crust and 21% of the atmosphere (air) is made up of oxygen. A person can live for several days without food, one or two days without water, but will survive unharmed for only a few minutes without oxygen. We need a continuous supply of oxygen since the body cannot store it like it can fluids and food.

One thing that affects the amount of oxygen produced is the amount of land that has been covered with concrete buildings and roads. As population grows, so do our cities. When a city gets crowded it is expanded or a new adjoining city is built. The Los Angeles area is a good example of this "concrete" expansion.

A formula for Growth in Demand for Highways* uses the equation Revenue = $Mx = Ly$, where x and y are constant numbers. This equation says that the amount of tax money spent on road construction depends on the mileage driven by the population (M), M in turn depends on the length of roadways in existence (L). It is interesting to know that the proportion $Mx=Ly$ was arrived at by assuming, from observations, that once a highway is completed it is soon filled to capacity with traffic. This leads people to believe that more roads are needed to accommodate the traffic.

*Principles of Mathematical Modeling, Clive L. Dym and Elizabeth S. Ivey, Academic Press, 1980, page 175.

CONSERVATION OF UNPAVED LANDS



LESSON PLAN: **Developing Concepts Strategy - The Environment**
TEACHER: Bernhard Frenznick
CLASS: High School Social Studies

OBJECTIVES:

1. Students will participate in Hilda Taba's strategy of developing concepts to conclude that the environment is not only biophysical, but that it is also aesthetic, economic, social and political as well. This will be demonstrated through discussion and developing concepts.

2. Students will use Hilda Taba's strategy to become better aware of the fact that our environment is multifaceted and interrelated. Students will generalize that changes in one part of the environment affect all other facets.

MATERIALS: Cards, markers, and tape.

INTRODUCTION:

1. Listening: Students will listen to a short story about atomic bombing of the United States.

   "The last strand of peaceful coexistence snapped during the bitter winter of 1993, plunging the U.S. and the Soviet Union into a nuclear nightmare from which the world has yet to awaken. On January 8 of that year, nuclear warheads totaling more than 4000 megatons destroyed military and industrial targets in the United States."

DEVELOPING CONCEPTS:

1. Teacher: What do you know about the probable short-term effects of a nuclear bombing? What do you know about the probable long-term effects?

   Student: There would be destruction of buildings, fires, secondary fires, death, illness, contamination, civil disorder, rioting, food shortages, medical shortages, radiation poisoning, cancer death, radiation poisoning from ozone layer depletion, irreversible adverse effects on environment and ecological systems, diminished food supply, mutations caused by radiation

in surviving plants and animals, and possibly a break down of civil order, government immobilized, cultural heritage destroyed, cities leveled, etc. (Identifying) (Write each idea on a card and tape on wall.)

2. Teacher: How would you group these different effects? (Grouping)

   Student: There would be physical and economic effects.

3. Teacher: These are two groups. Are there any others?

   Student: Political, social and aesthetic.

4. Teacher: Now that we have grouped the possible effects of a nuclear blast, can you think of a term that includes all of these effects? (Relating)

   Student: Our "environment"

5. Teacher: What can you summarize about our environment by way of these groupings?

   Student: The environment in not just physical. It is multi-faceted. One area of environment affects the others. (Summarizing)

LESSON_PLAN: **Environmental Imagery.**
TEACHER: Kathy Cote
CLASS: 12th grade Social Studies

CONCEPT: Some lyricists use environmental imagery to convey messages in their songs.

OBJECTIVES: Students will recognize and identify, verbally, how environmental imagery is used to convey messages in song.

Students will use Hilda Taba's strategy of exploring feelings to confront their feelings of advancing to the next stage in life.

MATERIALS: Recording of the song "Landslide" by Fleetwood Mac, a recorder, and copies of the song's lyrics for each student.

TIME	TEACHER ACTIVITIES	LEARNER ACTIVITIES
2 min.	Introduce song	
5 min.	Play song	Listen to song
	Ask students what they think is the message of the song.	State what song means to them.
	If needed, state what I think is the message of the song.	
10 min.	Ask students to express their feelings, fears, of moving on to the next stage of life.	Express feelings of moving on to next stage of life.
	Hand out copies of the song's lyrics.	
5 min.	Note how environmental imagery helps to convey the message of the song by referring to specific lyrics.	Refer to specific lyrics. Express how environmental images help to convey the message.

LANDSLIDE

I took my love; I took it down.

I climbed a mountain, then I turned around.

And I saw my reflection in the snow covered hills,

'til a landslide brought it down.

Oh mirror in the sky, what is love?

Can the child within my heart rise above?

Can I sail through the changing ocean tides?

Can I have dark seasons of my life?

Well I've been fraid of changing,

cuz I've built my life around you.

But time made you bolder, even children get older

Now I'm getting older too.

(Repeat + Oh I'm getting older too.)

I take my love, take it down.

I climbed a mountain, and I turned around.

And if you see my reflection in the snow covered hills,

will a landslide bring it down?

And if you see my reflection in the snow covered hills,

will a landslide bring it down?

Oh oh, will a landslide bring it down?

FLEETWOOD MAC